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Continuous Melting in a Small Foundry

How This System Worked Out in a
Gray-Iron Jobbing Shop—How the
Change Was Made—The Advantages

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The idea is generally prevalent that continuous melting is applicable only to foundries producing a single or very similar product—and then only in case of a large daily output. This is an erroneous conception, as often this system might be of special benefit to strictly jobbing foundries with a comparatively small daily tonnage.

Continuous melting does not necessarily require an elaborate or expensive outlay of special equipment. However, with this system, special machinery such as special molding machines, sand tempering and handling machinery, sand and mold conveyors and the like, when properly selected for the particular line of work, prove to be paying investments. Such equipment tends toward increasing the output per square foot of floor area, increasing the production per man, decreasing cost and improving the quality of the output.

How a small gray-iron jobbing foundry was changed from the usual afternoon heat to continuous melting with the consequent results is told in this article.

The foundry in question is operated in connection with a chilled car-wheel foundry. Though under the same roof the two foundries are operated entirely separate; the former produces only 33-in. standard car wheels and has a daily output of 300 wheels, the latter produces railroad and general jobbing gray-iron castings, varying in weight from a few ounces to several tons. At the time of the change the daily output was approximately ten tons, which was considered the maximum capacity of the shop on this class of work. Orders were several months ahead of production and the foundry was being operated at a loss.

It seemed impossible to better conditions under the old system and, being of a progressive nature,

the management decided to try continuous melting, also to add additional molding machines and other equipment with a view to increasing the capacity of the shop and with the hope of increasing its earning capacity as well—which was not in vain.

The only new equipment added before the system was changed consisted of a small cupola (lined to 30 in. inside of the lining) with the necessary blower and other equipment incident to the operation of the cupola. This was built along side of the old cupola, the two being served by the same elevator, charging buggies, etc.

When the cupola was in readiness, the shaking-out and sand-cutting crews, which had been accustomed to do their work after the heat was off in the evenings, were ordered to come in for work at the regular morning hour. A pouring crew, consisting of one experienced man and two helpers, was organized to do the pouring. The melter was ordered to have the metal ready to pour at 8 a. m. instead of 2.30 p. m. as was the usual custom. With these exceptions everything went on in the usual order without

any interruptions whatever resulting from the change.

The shaking-out and sand-cutting crews shake out any molds left over from the previous heat, temper the sand and clean up the shop generally until the pouring starts, after which they follow up the pouring crew, shaking out the molds, loading the castings into iron baskets to be delivered to the cleaning room, and tempering over the sand again.

The molders begin work at 6 a. m., which gives two hours molding in advance of the pouring; this is sufficient time for the snap and light floor molders to produce several flasks each on certain patterns



Fig. 1—Drop Bottom Sand Handling Bucket for Conveying Sand from the Tempering Floor to the Molders

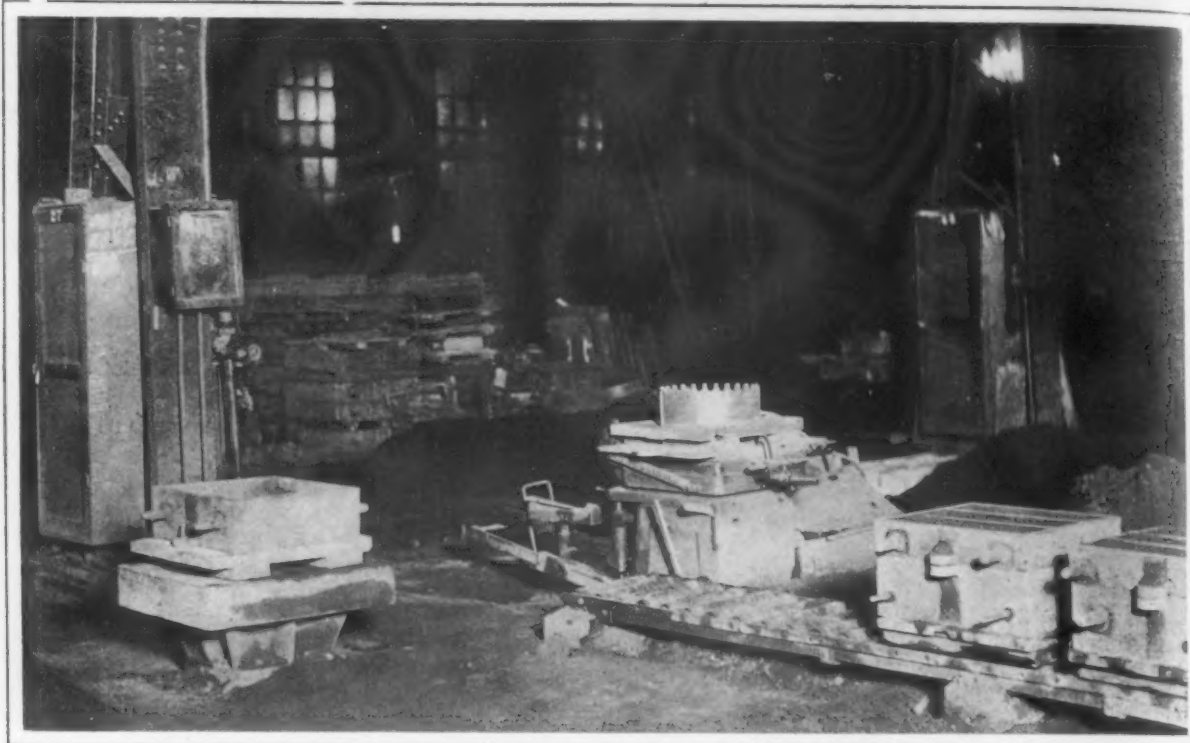


Fig. 2—Electric Jolt Roll-Over and Plain Air Jolt Molding Machines with Conveyors Arranged Between the Two Machines

and gives the heavy molders a good lead on the pouring crew. This is necessary in order to take care of the first iron and to allow of variations in the rate of melting of the cupola. This also takes care of any variation in the rate of production, which will vary slightly from day to day on account of changes in the class of work going into the sand. Again this is necessary to prevent the pouring crew following up the molders too closely and interfering with them in their work.

The molding floors are arranged in double straight rows, so that while one row is being put up the other is being poured and the sand retempered again. This same system is carried out with the molding machines, the sand being divided into two piles one on each side of the machine, so that first one and then the other is being used. This arrangement applies to light work only, where it is possible to use the sand over two or more times during the day, as the heavy molders are supplied with sufficient sand to put up their entire day's work.

The only material difference between this and the old system consisted in pouring the molds with a special pouring crew as they were being put up, using the same flasks and other special rigging over two or more times during the day and increasing the molding time from 2.30 to 4.30 p. m.—approximately 25 per cent. This made it possible to get out a large number of castings of any one pattern with a limited number of flasks, which is an especially desirable feature in jobbing shops, where it often happens that a number of castings off of one pattern are wanted on a hurry-up job wherein the prices at which the castings were sold will not justify the equipment of more than one or two flasks and other special rigging that may be necessary to do the job.

The increased hours for the molders at their regular labor of molding, would appear, on the face of it, as a hardship on them, but when you consider that the actual energy expended by a molder in pouring off and shaking out his day's work is often equal and sometimes much greater than the

total energy expended in putting it up, it would appear that this is in the molder's favor, and it is. However, it was hard to convince the molders of this fact in the beginning, but now after two years of trial they would not willingly consent to go back to the old system. While the increased output per molder was not in proportion to the increase in molding time at first, due largely to their unwillingness to take to the system, however, as they became reconciled to the changed conditions, the output gradually increased until it reached a gain of approximately 35 per cent per molder over the old system. This resulted from the continuous system rather than from any new or special equipment, as later, by the addition of more molding machines and special equipment, as will be described, the output per molder and also per man in the shop was increased still greater, as was the daily output of the shop.

The foregoing describes the system in its beginning and without any special equipment other than a small cupola, which was necessary to deliver metal at the rate of production of the molds. Acting on the principle that special machinery, when properly selected, forms an economical investment even with the old system, and that it would be still more valuable with continuous melting, additional equipment including sand handling buckets, power riddles, additional molding machines, mold conveyors, jib cranes and an automatic sand tempering and handling machine, some of which are shown in Figs. 1 to 4, were installed, and proved very valuable adjuncts to the general equipment.

The sand handling buckets, illustrated in Fig. 1, are used for conveying sand from the shaking-out or sand-tempering floor to the molders. As will be noted, they are of very simple construction and inexpensive but serve the purpose for which they were designed in a satisfactory manner.

The roller conveyors, illustrated in Figs. 2 and 4, are especially designed for handling lumber in planing mills and like establishments (from which the idea was borrowed); and have proved very efficient for conveying medium and light molds. They are built in 12-ft. sections interlocking one with another

and may be extended, by adding on sections, to any required length. A special feature of this conveyor is that it is portable and may be removed from place to place or changed at a minimum cost to suit particular jobs as conditions may require. They are arranged convenient to the molding machines for conveying the molds from the machines to where they can be poured and shaken out without interfering with the molder. These are especially adaptable to snap molding but are used with success for molds having a gross weight of 450 lb. and less.

The sand handling machine, illustrated in Fig. 4, accommodates four plain air squeezers. Conveyors are arranged on two sides of the machine each serving two molders. Here the molder places his mold on the conveyor and gives it a shove to where it is poured, after which the molds are rolled out to the end of the conveyors where they are shaken out, the casting placed in an iron basket and the sand tempered and shoveled into the hopper. A chain conveyor carries it up and dumps onto a riddle through which it falls into the hoppers serving the molding machines and is again ready for use. This was designed especially for very light castings, which when shaken out at the proper temperature do not overheat the sand, so that by the time it has passed through the different stages and back to the mold, it is ready for use again. However, if the sand should be slightly off temper, as sometimes happens, cold sand, a pile of which is left convenient to the molder, is added next to the pattern and serves to overcome this difficulty.

An arrangement of the roller conveyors between an electric roll-over jolt and a plain air jolt molding machine, operating on flasks of 250 lb. and less, is shown in Fig. 2. With this arrangement there

is only one operator to a machine, one making the cope and the other the drag halves of the molds on their respective machines, and assisting each other in lifting and closing the molds. The operators clamp the molds and roll them out to where they are poured with an overhead electric crane. After being poured they are rolled out to the end of the conveyor and shaken out by laborers—the castings being placed in an iron basket and sent to the cleaning room. The sand is tempered by hand and after cooling sufficiently for use again is loaded into the sand handling buckets and conveyed back to the machines.

This arrangement does not operate the molding machines at their maximum capacity, yet it has its advantages; particularly, in requiring a minimum of flasks and other equipment for each particular job or jobs, especially on small orders where the quantity does not justify the expense of elaborate equipment; again, by not overcrowding the conveyor it allows of some flexibility for pouring and shaking out the molds; furthermore, it increases the production per molder.

Heavy machine and floor molding is arranged together in one half of the foundry which is served with a 10-ton electric traveling crane. The molds are poured on the molding floor and after setting are conveyed, by the traveling crane, to the shaking-out floor where they are shaken out and the sand, after being tempered and allowed to cool is conveyed back to the molding floor, using the sand handling buckets illustrated in Fig. 1.

At the beginning some difficulty was experienced in operating the small cupola for so long a period (8 hr.), and especially in melting fast or slow to conform to the rate of molding. However, after some experimenting these difficulties were finally

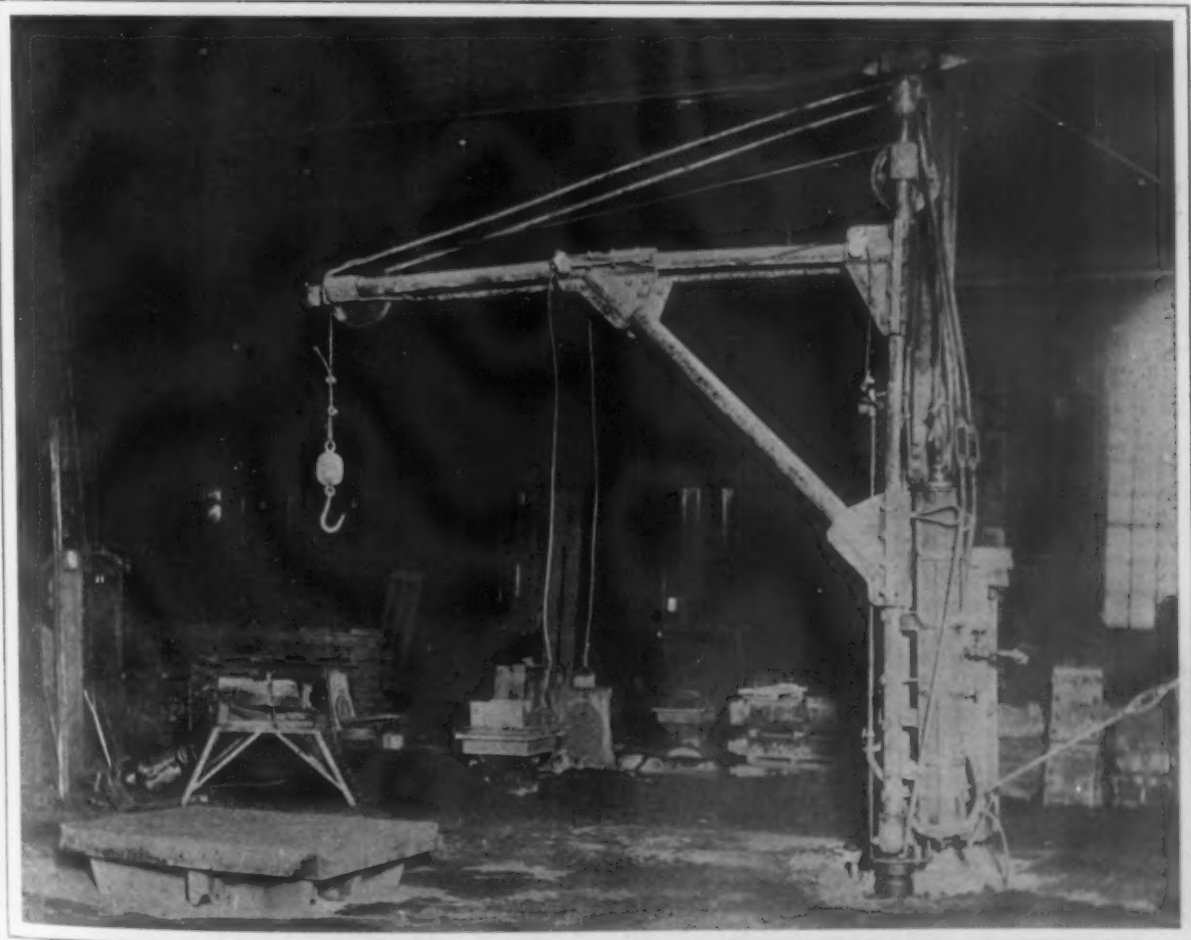


Fig. 3—Two Ton Air Jib Cranes Arranged to Serve an 18-In. Air Jolt Molding Machine

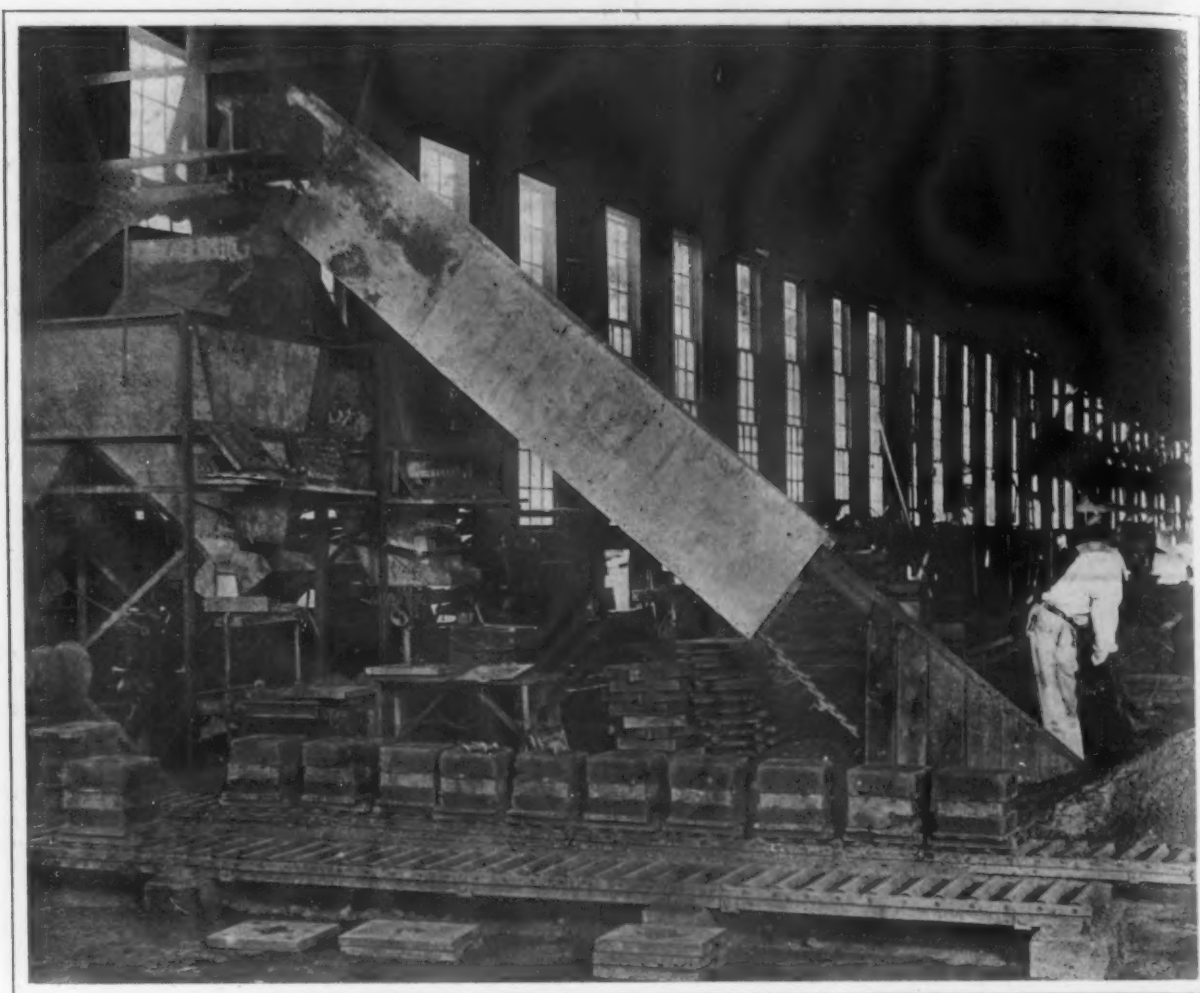


Fig. 4—Automatic Sand Handling Machine Serving Four Plain Air Squeezers

overcome, and it was found possible to extend the heat even several hours longer and to vary the rate of melting over 100 per cent by changing the coke and blast, etc., and without injury to the metal.

Special mixtures, sometimes carrying as high as 40 per cent steel, are often melted during the heat, for use in special castings, which by using blank coke charges and taking other necessary precautions is accomplished without interfering with the regular heat in any way.

Summarizing the results obtained by this system, as shown by the foregoing description, the following—which is computed from data taken over a three-months' period—shows the advantages obtained by this method:

| | Per Cent |
|--|----------|
| Increase in daily output..... | 79.0 |
| Increased output per molder..... | 68.5 |
| Increased output per man (including pattern makers and all other laborers connected with this department)..... | 51.0 |
| Decrease in cost of production, labor (including all direct and indirect labor and supervision)..... | 35.4 |
| Decrease in defective castings..... | 16.7 |
| Increase in molders' earnings..... | 43.0 |

As will be seen from the above figures, although the labor cost for production was decreased 35.4 per cent, the earnings of the molders increased still greater so that this system, as it has been worked out in this instance, has proved very beneficial both to the company and to its employees.

Exports of Swedish Lapland iron ore for 1915 had been estimated by the Kiirunavara-Luossavara Company at 5,050,000 tons, of which 3,300,000 tons was to come from Kiirunavara, but as the war is expected to last through 1916 the company reduces its estimate to 2,000,000 tons from Kiirunavara and 500,000 tons from Gellivara. Exports for 1917 are estimated at 5,350,000 tons.

Aluminum from Clay

A process of obtaining aluminum from clay has been patented (U. S. 1,160,431) by Grenville Mellen, of East Orange, N. J. The clay or kaolin is fused with sodium sulphate and sulphuric acid, or with its equivalent of sodium bisulphate in proportion to form aluminum sulphate and free silica. After the reaction is completed the mass is cooled and dissolved in hot water or in a hot dilute solution of sodium sulphate containing a small quantity of aluminum salts from a prior reaction. The hot solution thus obtained is filtered and concentrated if necessary. A concentrated solution of sodium fluoride is added, precipitating aluminum fluoride, which is separated by filtration. This is fused with sodium chloride and electrolyzed, producing aluminum. The sodium sulphate filtrate is concentrated to crystallize the contained salt, which is used again. By-products are pure silica, chlorine and sodium sulphate and the process is cyclic.

The American Foundry Equipment Company, the consolidation of which with the Sand Mixing Machine Company was announced in *THE IRON AGE*, Dec. 30, 1915, is occupying its new plant at 1111 Power Avenue, Cleveland, Ohio. The factory, which is a new structure, provides increased facilities for developing and manufacturing foundry equipment and affords room for future growth. A stock of repair parts for the sand blast apparatus of the American Foundry Equipment Company and the automatic sand mixing machine of the Sand Mixing Machine Company will be carried in stock to give better service in the future to the customers of both companies, which are still operating under their individual names. H. L. Wadsworth, the inventor and designer of the sand blast apparatus of the company, is factory manager in charge of all the mechanical departments and will be assisted by Charles L. Benham of the Sand Mixing Machine Company, who has been appointed factory superintendent.

HEAT TREATMENT OF CHAINS

Various Methods Used and Their Advantages— Overstrain and Fatigue

The recognized importance of the strength and condition of chains in steel mills and foundries, especially from the "safety first" point of view, lends importance to the following report of a "Memorandum on Chains and Other Lifting Apparatus" by G. S. Taylor, an inspector of factories in England, which discusses the question of heat treatment:

It is well known that the metal of a chain deteriorates with use and that its tenacity can be restored by annealing. Bad accidents do occur now and again owing to neglect in annealing chains periodically, and such accidents are entirely unavoidable. Mr. Taylor does a good service in giving an account of the various ways in which the annealing is done in different works.

CLOSE-ANNEALING PROCESS

The close-annealing process is considered the best, and is employed by such firms as have the necessary plant. The chain or article to be annealed is placed in a gas or oil-fired muffle furnace, heated to redness out of contact with the air, and then allowed to cool slowly either in the furnace or covered with dry sand or ashes after removal. Close-annealing prevents oxidation and subsequent scaling of the surface of the metal, and the chain is heated more uniformly than other types of furnaces. Coal or coke may also be used for a close-annealing furnace and a fire-clay gas retort is said to make a good muffle for these furnaces.

Where close-annealing is not employed the chains are annealed in an ordinary reverberatory furnace, as used for heating plates, or in a small furnace of the same kind specially built for the purpose. The chain should not come into contact with the fuel, which should be as free as possible from sulphur or phosphorus. Where an ordinary plate furnace is used the chains are often placed in the hot furnace on Saturday and removed on the following Monday when quite cold. In special annealing furnaces the chains are maintained at a uniform red heat for some time; after removal they are either allowed to cool in a mass on the shop floor or covered with sand or ashes and cooled slowly. It is contended by some that cooling in sand or ashes is unnecessary for wrought-iron articles containing little or any carbon while these precautions are considered essential by others. Possibly the cooling en masse is almost as effective for practical purposes, especially if the articles are covered with plates to prevent the chilling effect of cold air. Several chain users, however, have demonstrated by experiment the advantage of slow-cooling.

TREATMENT IN A SMITH'S FIRE

A method of annealing, chiefly followed in one district, consists in passing a chain link by link through an ordinary smith's fire. Each link is heated to redness, then removed from the fire and examined carefully while red hot. Cracks or flaws can then be more readily detected. The chain is allowed to cool in the open air. Although for examination purposes this open-fire method of annealing is advantageous it is not to be recommended. In some works the chains are merely placed in a pile on a smith's fire, covered over with fuel and heated up with the air blast. This method is faulty, in so far as some links are overheated, while others are not raised to a temperature sufficient to have any useful effect, and therefore the chains cannot be considered as "effectually softened," although this is difficult of proof.

Another method of annealing is used frequently where wood is readily obtainable. The chains are either placed on a grid, supported above the ground, or hung from a bar supported by the sides of a specially constructed pit or by uprights. A wood pile is built over the chains, oakwood being preferred, the chains are heated by the wood fire and allowed to remain in position until the ashes are cold. Satisfactory results are claimed for this method of annealing, as wood is free from sulphur and phosphorus and does not affect the

metal injuriously, while the temperature of a wood fire is comparatively low and the metal is not over-heated and rendered brittle.

OVERSTRAIN AND FATIGUE

A differentiation is made in the memorandum between hardness in the metal of a chain resulting from overstrain, due to stresses exceeding the elastic limit being set up by jerking or overloading, and the deterioration known as "fatigue," caused by repeated loadings, which may all be well within the elastic limit. The former alters the physical properties of the metal, with gradual development of greater hardness and a consequent decrease in the power of elongation, changes attributed by Unwin to the slow accumulation of permanent set. What happens in the case of fatigue is much less certain. Recent research has shown that it is not, as commonly supposed, accompanied by crystallization of the metal. An explanation of the fatigue phenomenon advanced a short time ago is that in prolonged working incipient cracks are set up in the metal which gradually extend until fracture occurs, and that what annealing really does is to weld up these undeveloped cracks while the ruptured articles are still clean and unoxidized.

American Electrolytic Zinc

Commenting, in his statement to shareholders, on what is believed to be one of the most important metallurgical accomplishments of the many that have made the last five years the most important period in the history of mining, John D. Ryan, president Anaconda Copper Company, said:

In many of the mining districts of the West, particularly those which are producers of either silver-lead or copper ores, zinc in varying quantities forms an important and hitherto very objectionable constituent. Found usually in quantities insufficient to justify working the ores for the recovery of this metal, its presence occasioned the metallurgist numerous difficulties in the endeavor to eliminate it while saving the valuable metals associated with it in the ore. These difficulties compelled the smelters to impose heavy penalties on the zinc content in excess of certain percentages.

The presence of such refractory ores in some of the mines of the Anaconda Company led to a careful study of the problem by its research department. Gratifying success has resulted from this study. An electrolytic process has been evolved and patented to the company which makes it possible at a satisfactory cost to extract a high percentage of the zinc content of such ores, while the other valuable metals are precipitated in the form of an easily reducible residue. Following experiments sufficiently long continued to demonstrate the success of the method, a plant capable of producing 20,000 lb. of electrolytic zinc per day was built at Anaconda and has been in successful operation for several months. The product is very pure, its zinc content being about 99.9 per cent. The brand, which has been trademarked Anaconda Electric, finds ready sale at a considerable premium among manufacturers whose requirements demand zinc of the highest grade. This operation has been so successful that the company is now enlarging the plant at Anaconda sufficiently to make an output of 50,000 lb. of zinc per day. The product of this plant has been sold for a full year from the time when it will be in complete operation, at an estimated profit of over \$4,000,000, and construction has been started upon a plant at Great Falls capable of making an output of 70,000,000 lb. of zinc per annum, which we hope to have in operation in the early autumn of this year.

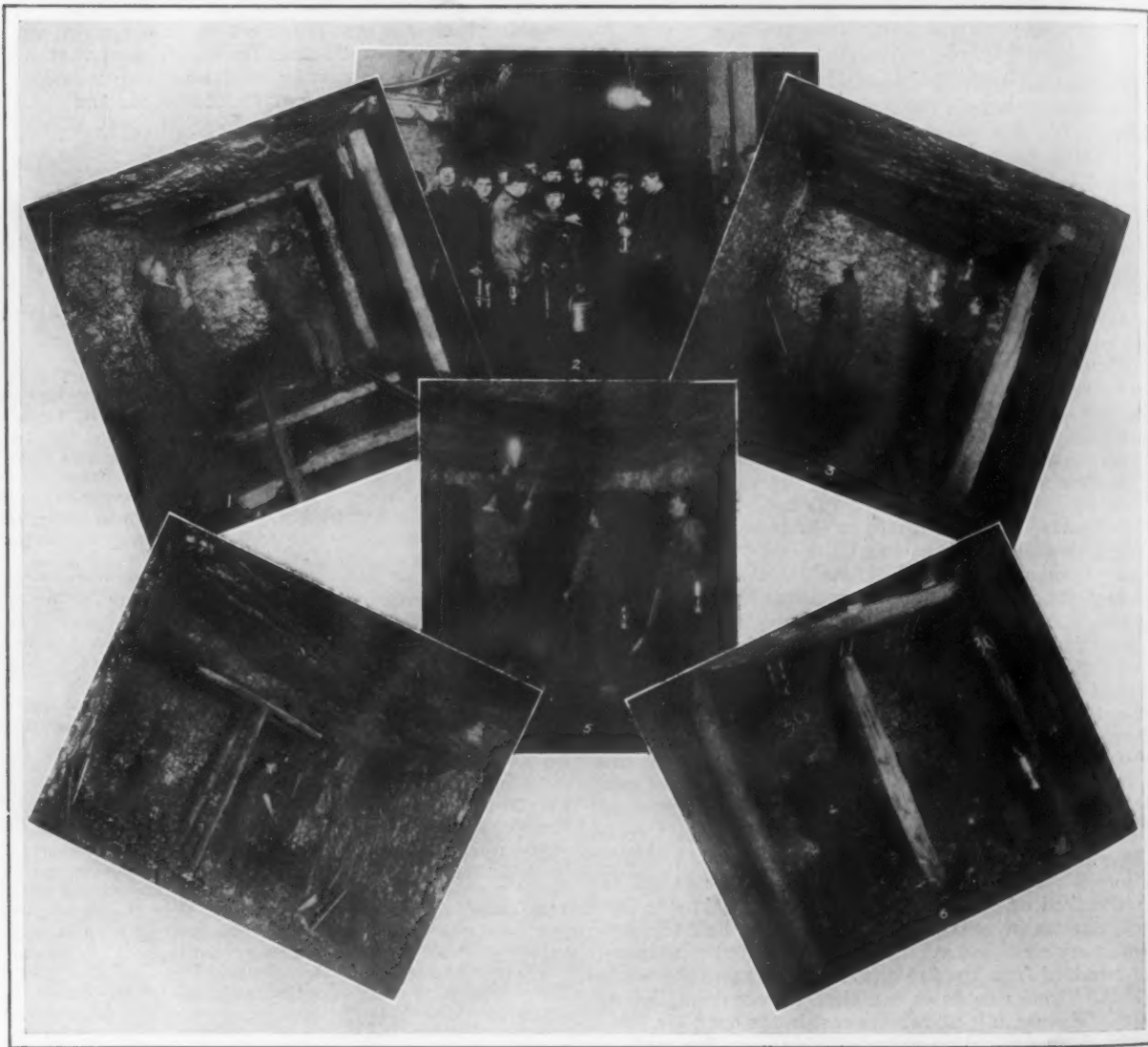
Another chapter in the unfortunate history of the bridge shop originally operated by George W. Jackson, Inc., in Chicago, passed with its sale recently in foreclosure proceedings in behalf of the bondholders. Following the failure of the original owner, the plant was operated under a temporary arrangement by the Vierling Steel Company. A period of idleness followed, after which the Chicago Steel Products Company, an organization in which a number of the creditors of George W. Jackson, Inc., were interested, was formed, and operated the plant for about a year. Unable to break even in its operations, this company liquidated after a brief existence, and since that time this capacious and liberally equipped plant has been continuously idle. Its future presents an interesting problem.

"Safety First" in Coal Mine and Coke Plant

The H. C. Frick Coke Company Has Expended Much Money, Time and Effort to Make Its Plants Safe and to Educate Its Employees Away from Dangerous Methods of Work

The welfare work of the H. C. Frick Coke Company, Pittsburgh, as practiced at practically all of its forty or more coke plants in the Connellsville region, was described in THE IRON AGE, Jan. 7, 1915. The Frick Company has spent thousands of dollars and has used every means in its power to advance the social and working conditions of its many employees. It has also spent as much time,

safety committee and special inspectors composed of fifteen men. It has an inside workmen's safety committee of 315 men, an outside workmen's safety committee of 163 men, and a permanent safety committee of 580 men. The Hostetter-Connellsville Coke Company, an identified interest, also has an inside workmen's safety committee of nine members, an outside workmen's safety committee of six-



HOW ACCIDENTS ARE PREVENTED IN COAL MINES

1. The boss remains to see that the roof is properly braced according to instructions. 2. Miners are searched for matches and inflammable articles before entering mine. 3. The boss marks the place where additional props are to be set. 4. A weak roof supported by long caps over the posts. 5. The boss directs the timberman to make the place safe. 6. A safe method of timbering with a tender top

effort and money as it judiciously could in order to make working conditions in its coal mines and at its coke plants as safe as is humanly possible. For some years the slogan, "Safety, the First Consideration," has been kept prominently before the employees.

SAFETY COMMITTEE

The work done in the interests of safety by the Frick Coke Company has been stupendous. At the present time the company maintains a general

teen members and a permanent safety committee of twenty-one members. This is a total for both companies of 1109 men, who devote their efforts and thought to the general advancement of safety work. The inside committee serves in the coal mines, and the committee for each mine consists of three employees who can read and write. They are appointed by the superintendent, and one is a miner, one a driver and the third comes from the general work force of the mine. This committee serves for one year, and during that period makes three in-

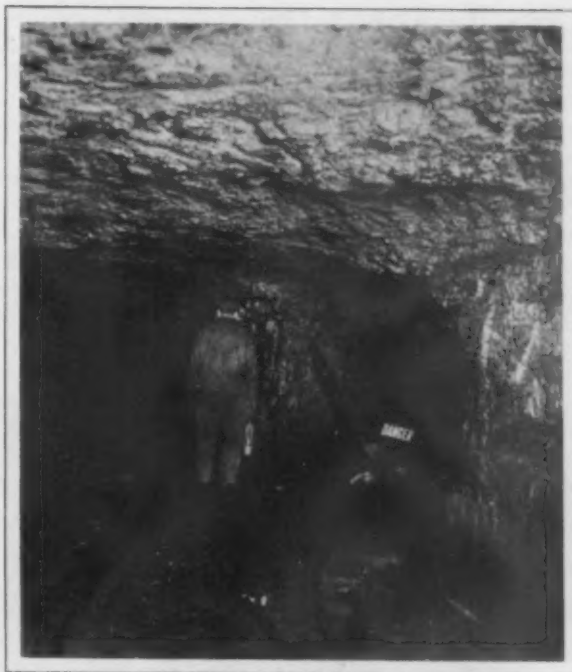
spections and reports one in each of the months of March, August and November. After each inspection the senior member is replaced by a new man, so that there are always two men on the committee who have made at least one inspection.

The outside committee serves at the coke plants, and each plant committee also makes three inspections and reports per year. Each outside committee is composed of a coke drawer, or leveler, one man from the shop forces or boiler house and a third man from the miscellaneous men at the plant. The workmen's safety committees attend the regular monthly safety meeting held at each coke plant. These committees in all cases make their own reports without any interference, dictation or assistance from anyone. The reports are signed personally by each member. The original reports are sent to the general offices of the Frick Coke Company at Scottsdale, Pa., where steps are taken at once to remedy or correct any defects found in the equipment or practices at any of the coal mines or coke plants.

The company also has what is known as a "Permanent Safety Committee" at each of its coal mines. This is composed of the superintendent, mine foreman, assistant mine foreman, fire bosses and rib bosses. There is also a "Safety Committee" at each plant composed entirely of workmen. The safety committee of workmen is appointed by the superintendent, and it examines the mine at least once every three months and makes written recommendations for bettering its condition. This committee has from three to five members, according to the size of the mine, and the term of office is usually a year. The term is made short with the idea of having as large a number of men as possible serve on it, and they are paid for the time spent in the service of the committee at the same rate as when they are at their regular duties.

FIRST-AID CORPS

Although the Frick Coke Company has adopted every known device for the safety of its employees, for the prevention of accidents and for the improvement of mining conditions, it has also provided, against the event of accident, a first-aid corps at each of its large plants. Each corps consists of five men. These men are carefully selected and are des-



Correct Method of Placing a Danger Sign. The entrance to the dangerous area should be fenced off and the sign placed on the fence

ignated, after they have passed an examination as to their fitness for rescue and first-aid work, by wearing a red, white and blue button with the words "First Aid and Rescue Corps" engraved thereon. They are also required to pass a medical and physical examination, after which they are instructed in first-aid treatment by doctors paid by the company. They also receive twelve lessons in rescue work at one of the company's training stations.

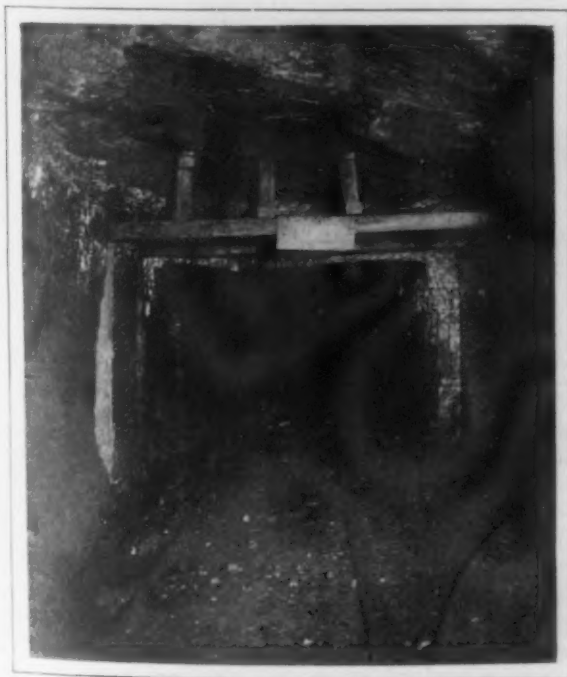
There are three of these training and rescue stations centrally located to all of the company's operations throughout the Connellsville and lower Connellsville regions. Each one is completely fitted with Draeger oxygen apparatus, a pulmotor and other apparatus necessary to the carrying on of rescue work. After passing the examinations for service on the rescue corps, the men of the first aid and rescue corps report at intervals of four months at the training station for additional instruction, so they may be kept fully informed on the best modern methods of performing their duties.

In case of injury to, or death of, an employee, the Frick Coke Company has a plan of voluntary accident relief, and the entire amount of money required to carry out the plan is provided by the company, without contributions from the employees.

INSTRUCTION OF EMPLOYEES

The company a few years ago employed men for the especial purpose of instructing miners who are employed in the extracting of ribs and pillars, how to properly timber a working place and how to "draw" the timber when it is safe to do so. Such a man is called a "rib boss" in the Connellsville region, and the number employed in each mine varies from one to six, depending on the number of miners engaged in that class of work. Their duties require them to keep moving from place to place, giving instructions in safe mining methods, drawing and often assisting to set up timbers, or withdrawing men if the condition of the top seems to render it too dangerous to work in the mine.

The company also maintains fire-fighting apparatus, located in convenient places, both in its coal mines and around its towns where the em-



The Wrong Way to Place a Danger Sign

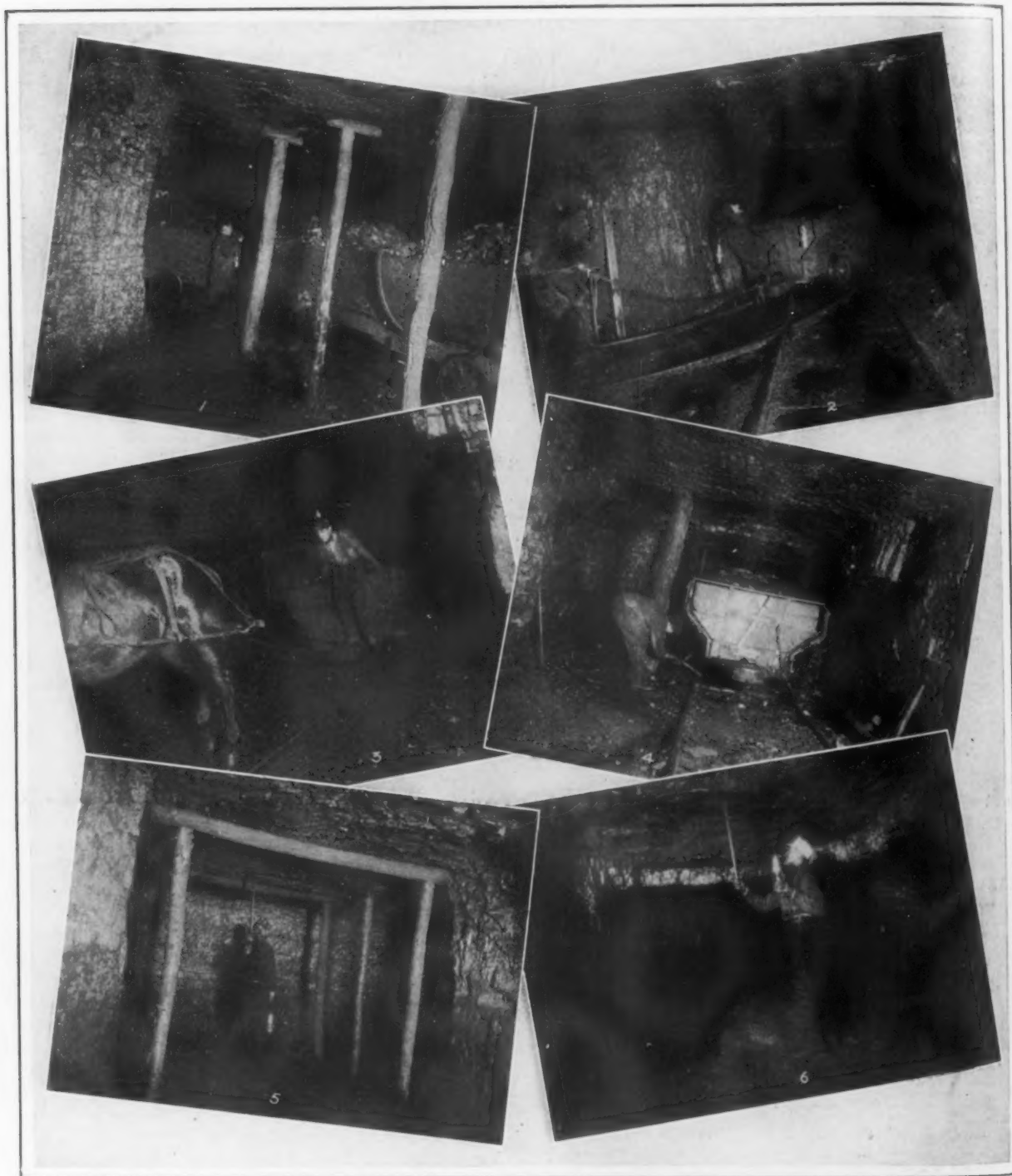
ployees live. This apparatus is regularly inspected by persons delegated for that work, as are also all mine buildings, houses, outbuildings, fences, sewers and drains.

DANGER SIGNS

In addition to various printed and illuminated signs, the company also uses the danger signal approved by the Department of Mines. This is of

ner. These latter are board signs about 5 ft. long and 10 in. wide, so placed as to warn persons approaching electric power lines. A sign painted "This way out" in white letters on a black background, and in five languages, is posted at road junctions in the traveling ways of the mines.

The company goes further in the matter of safeguarding its men, and at all its coal mines, both inside and out, has placed permanent danger signs



HOW ACCIDENTS OCCUR IN COAL MINES

1. Driver attempts to couple approaching cars on inside of curve and is crushed between them. 2. Driver crushed between car and side. 3. Driver rides in front of trip. 4. Miner has not properly blocked his car and when the dirt is cleaned from the wheels the car runs away down grade. 5. Careless testing of rock. The top is bad between the crossbars but the miner does not know it. 6. Trusting to the sound of rock when struck by a pick to ascertain whether or not it is safe.

enameled steel, and has an oval center, with the word "Danger" in letters 4 in. high across the center of the oval. The letters are white, the oval red and the remainder of the sign black. The company also uses a sign, "Do not pass under—2200 volts." This has a red background and white letters. A sign, "Do not touch," is painted in the same man-

wherever the least danger of an accident exists. When men are working in the shafts, a sign is placed reading, "Men in shaft," to prevent accidents caused by mistakes in moving cages. When workmen are cleaning out or making repairs to the inside of a boiler, a sign, reading "Man in boiler," is placed on the outside. In addition the steam

valve of this particular boiler is locked and the key is carried by one of the men engaged on the work until the repairs are finished. At all the coal mines there is a complete equipment of telephone systems and all places, such as stables, underground offices

SAFETY PRECEPTS

- 1—Be sure a place is safe before you begin work on it.
- 2—Test the safety of the top and look for "slips" often as you mine the coal away beneath it.
- 3—Set plenty of timber in your working places.
- 4—Set the timber IN TIME—delay is dangerous.
- 5—Where you are not sure the top is safe, set "temporary" timber for safety while putting up "permanent" timber.
- 6—Set cross-bars in working places that have been, or are likely soon to be, under great weight before you have mined it out.
- 7—If the top coal is crushed or broken, do not leave it up—it is not safe.
- 8—Do not put your hands on corners of cars to push, or place them.
- 9—Keep YOUR track in good condition.
- 10—Travel on roads made for that purpose.
- 11—Do not pass DANGER signs.
- 12—Use a clevis block in front of car wheel while loading, in all places going to the dip or to the rise, where cars would run away.
- 13—To make it more safe use a tie-and-block in front of the car in all places going to the rise.
- 14—Do not carry tools, like augurs or iron bars, on the shoulder on roads in which a trolley wire is hung.
- 15—Try to avoid accident to yourself.
- 16—Help to prevent accident to others.
- 17—Always use the safety devices provided.
- 18—It is better to cause a delay than cause an accident.
- 19—Safety — it pays to think before you act.
- 20—Give the side of safety the benefit of a doubt.
- 21—Make up your mind to prevent accidents as much as you can.
- 22—Do not be careless at work, you may be injured.
- 23—Be sure everything is safe, then go to work.
- 24—Tell your Foreman or other official of any bad condition or dangers as soon as you know of them.
- 25—Small neglects are apt to cause serious accidents.
- 26—If you know how to prevent an accident tell the boss.
- 27—When the boss tells you how to keep yourself safe, do as you are told.
- 28—Look out for the man working near you—you might hurt him.
- 29—Do not take risks—your fellow workman may be the one who will be hurt.
- 30—Every injury, no matter how slight, should receive proper medical attention.
- 31—Be careful not to injure your safety lamp.

DRIVERS AND BRAKE-MEN

- 32—If you have learned bad or unsafe methods of doing your work, cut them out at once.
- 33—Do not make "flying switches."
- 34—Do not ride in front of loaded trip unless your work cannot be done any other way.
- 35—Do not ride between cars unless your work cannot be done any other way.
- 36—Keep your trips under control.
- 37—Do not excite your horse or mule by rough or bad treatment.
- 38—Promptly notify the mine officials of—
(a) Bad Track.
(b) Slate, dirt, or posts piled along the side so that you cannot pass the trip in safety or keep it under control.
(c) Bad roof, when known to you.
- 39—Take in posts or other timber when required.
- 40—Put a "drag" on rear of car being hauled out of "dip" places.

SHOT FIRERS

- 41—Do not fire shots with less than 100 ft. of "lead" wires.
- 42—Do not fire shots with damaged "lead" wires or bad connections.
- 43—Do not carry "electric caps," except in a locked case.
- 44—Do not fire a shot where there is any coal-dust within 100 ft. of the shot-hole, or where the dust has not been thoroughly wetted for a distance of at least 100 ft. from the shot hole.
- 45—Do not put more than 1½ lbs. of explosive in any shot hole.
- 46—Do not fire shots where there is not enough shelter from the blast.
- 47—Do not go back to a miss-fire shot before the lead wires are disconnected and five minutes have passed.
- 48—If you have charged a shot and cannot fire it, fence off the place and put up a danger signal before leaving it.

walls, buildings, supporting columns, etc., "No clearance" signs are displayed.

The company has also had several hundred pictures taken showing how accidents occur in coal mines, and the best ways of avoiding them. These are used in lantern slide lectures, which are delivered to the men in various halls in the towns of the company, and the lecturer describes how the accident, as shown on the screen, has happened, and how it could have been avoided. Some of these photographs are reproduced herewith.

In the purchase of machinery for its coal mines and coke plants, the Frick Coke Company has drawn up safety regulations governing the purchase and construction of such machinery that do much to add to the safety of the employees.

Much of the safety work of the Frick Coke Company was perfected through the efforts of Thomas Lynch, a former president of the company, who died about a year ago. He was aided by superintendents and other employees of its various mines and coke works.

A pamphlet, entitled "Safety Precepts," printed in the English and in foreign languages, is given to each miner and he is required to read it.

Merchant & Evans Company

The Merchant & Evans Company, Philadelphia, Pa., has celebrated the fiftieth anniversary of its founding by removing its offices and warehouse to a large modern building which it has erected adjoining its works on Washington Avenue, between Twentieth and Twenty-first streets, in that city.

In 1866, Clark Merchant, who had retired from the United States Navy with the rank of lieutenant-commander, established the business in Philadelphia as Merchant & Co., dealing principally in brass, bronze and copper in all forms as then manufactured, and trading also in tin plate and other products that were imported from England and other countries.

The continued growth of the business made it necessary to open branch offices and warehouses at several points in the United States, and to enlarge the line of products handled. The co-partnership of Merchant & Co. was changed to a corporation under the style of Merchant & Co., Inc., with Clark Merchant as its president. After Mr. Merchant's death, Powell Evans assumed control of the business, which then became the Merchant & Evans Company. The company now has plants in Philadelphia, Wheeling and Chicago, and offices and warehouses in Philadelphia, New York, Baltimore, Cleveland, Chicago, and Kansas City. To satisfy the demand for its tin and terne plates, the company built a modern tin-plate mill at Warwood, W. Va., a suburb of Wheeling.

President Evans early saw the possibilities open to manufacturers of gasoline-propelled vehicles and parts therefor, and to the company's line he added automobile clutches, alignment joints, rear axles, jackshaft transmissions, grease cups, metal tire cases, and, finally, completely erected gasoline motor trucks and tractor trucks. He is recognized as an authority on fire prevention and protection, and is chairman of the Fire Prevention Committee of the Chamber of Commerce of the United States, the National Hardware Association, and the Fire Prevention Commission of the city of Philadelphia. During the existence of the old International Sprinkler Company, of which he was president, he designed various sprinkler heads, valves and other automatic sprinkler devices which came into wide use. Recently he secured official approval of a new type of fire door.

The Marting Iron & Steel Company, operating blast furnaces at Ironton and Marting, Ohio, has bought 10 acres of land lying between those two points which will be used for future extensions, the nature of which has not yet been determined.

and other buildings where the men are likely to congregate, are of fireproof construction, and kept as clean and neat as possible.

Life belts are provided for workmen working at a point above the ground where a fall might cause serious injury. At points where there is not clearance for a man between a moving car and wharf

Organizing for Industrial Preparedness

The Inventory which Is To Be Taken by Five Directors in Each State Appointed from Five National Organizations

Some of the details of the industrial inventory which is to be made of the factories of the country in the movement to organize for industrial preparedness are given by Spencer Miller, Lidgerwood Mfg. Company, and a member of the Naval Consulting Board, in a paper to be presented at the spring meeting of the American Society of Mechanical Engineers, New Orleans, April 12. It will be recalled that at the request of the President of the United States each of the following societies was invited to appoint a member in each state to serve as a director, each state thus to have a committee of five State Directors: the American Society of Mechanical Engineers; the American Society of Civil Engineers, the American Institute of Electrical Engineers, the American Institute of Mining Engineers and the American Chemical Society. The scheme has been brought about largely by the Naval Consulting Board's Committee on Production, Organization, Manufacture and Standardization, Howard E. Coffin, vice-president Hudson Motor Car Company, Detroit, chairman.

For taking the inventory, an elaborate printed form has been prepared. It will be "a strictly confidential, non-partisan, non-political and wholly patriotic inventory of our country's manufacturing and producing resources. The information contained in these blanks is not to be used in any way to affect the business of the concern reporting, or for comparison with any other report of any kind previously filed by it. The value of this patriotic work can best be insured by making this report complete in every detail. We must deal with the problems of an adequate national defense as we deal with the problems of our everyday business life. We must face facts—not theories. We must do now, in time of peace, quietly, efficiently and thoroughly, those things which all know must be done to achieve true industrial preparedness, and which, if postponed until an outbreak of hostilities, must result in tremendous losses in lives and money."

The form properly filled out will give:

1. The names, post office address, age and nationality of the officers and directors.
2. Capitalization, commercial rating and banking connection.
3. Description and location of plant, its possibilities for expansion, its fire protection.
4. The telephone and telegraph facilities of the plant.
5. Sources of raw material and its character.
6. Character of products, volume or tonnage and its value per annum—proportion shipped abroad.
7. If munitions of war have ever been manufactured, the quantity produced and ultimate possible capacity.
8. Character of labor—union, non-union or open shop—number and nationality of employees.
9. If women are employed, and the possibility for further employment of women.
10. Transportation facilities—rail and water.
11. Under the heading "agreements" appears the following, which is quoted in full.

AGREEMENTS

- Will bid upon U. S. Army and Navy contracts in time of peace
- Will accept U. S. Army and Navy contracts in time of war

Will accept minimum annual order (See Clause A)

Clause A. Minimum order for annual production will be accepted with the understanding that such order will be restricted to that product for which the manufacturer's equipment is best fitted. Also, that such order shall be for only such small quantity of product as will insure familiarity with the work upon the part of the manufacturer's organization.

The manufacturer agrees that this minimum annual order shall be put through the factory in regular course and in such manner that foremen and those holding positions of responsibility shall become familiar with the peculiarities incident to the manufacture of these goods. In time of war the manufacturer will be expected to concentrate upon this same product, and it is essential, therefore, that his entire organization, including purchasing, manufacturing, inspection, shipping, engineering, cost keeping and administrative departments be made familiar with the work. Minimum orders will not be of sufficient quantities to interfere with manufacturer's regular production.

Will accept payment in accordance Clause B

(Wording of Clause B not fully determined at time of going to press.)

Will construct jigs and tools in accordance Clause C

Clause C. The manufacturer will agree to make and preserve one set of special jigs, tools, gages or fittings necessary for the production of these goods, and corrected drawings shall be kept on file in the engineering department of the plant covering such special jigs, tools, gages or fittings. In short, the engineering or designing department shall maintain at all times corrected drawings from which the shop may, upon short notice, construct the necessary equipment for quantity production.

Will enroll skilled labor in "Industrial Reserve" (see Clause D).

Clause D. In war as now waged the industrial force has become quite as important as the fighting army. Skilled mechanics in all lines of production work must be kept from enlistment in the regular army and must be retained in the factories, mills and mines for the production of munitions. It is essential, therefore, that the names of these skilled workmen be listed and that the men themselves be enrolled in the industrial reserve. Explanations and instructions as to the detail of such organization will be submitted at a later date. A button or other distinguishing mark will be supplied by the government in the event of war to skilled workmen enrolled in the industrial reserve, and such enrollment will be considered to carry with it honors equal to enrollment in the fighting army. A government card will be issued to each man enlisted.

Will agree to limit profits in time of war in accordance with governmental regulations (basis cost plus)

Will insert clause in all civil contracts making them contingent upon governmental needs in time of war

Will agree to restore existing labor agreements at close of war

List any and all agreements now in force

12. An inventory in detail of tools, furnaces, etc., and their capacity.

THE FACTS COLLECTED

We shall also know from this inventory:

Whether America is independent of foreign countries for raw or manufactured war material, and if not, wherein we are lacking and to what degree.

In what kind of munitions we have ample manufacturing facilities and wherein we must provide means for making up the deficiency.

Whether it be prudent for the government to build new arsenals and other works in the central part of the United States.

Possibly it will transpire that the most efficient plan would be for a government factory to make standard gages, jigs and templates and loan or sell them to certain shops for use in the manufacture of shells, rifles, etc.

This work of industrial preparedness, Mr. Miller observes, should serve to inspire our machine tool builders to perfect and improve their product and perhaps to standardize their machine tools to the end that those who must needs purchase them would find an adequate and immediate supply available in case of emergency.

The various engineering societies contain in their membership men who could prepare most valuable

papers on the subject of ammunition manufacture. For the present there may be many secret processes which for the time being may not be forthcoming in the way of books and papers, which, however, might be prepared in advance and held until the hour of need when through patriotic motives they could naturally be published for the benefit of the nation at large.

BETHLEHEM STEEL REPORT

**Net Earnings in 1915 Were \$24,821,408.25,
Against \$9,649,667.71 in 1914**

The report of the Bethlehem Steel Corporation for the year ended Dec 31, 1915, shows that the total net earnings from operations of the corporation and its subsidiary companies, after deducting expenditures for ordinary and extraordinary repairs and maintenance (approximately \$4,391,000) amounted to \$24,821,408.25, as compared with \$9,649,667.71 in 1914.

From these earnings were deducted interest on bonds and notes of subsidiary companies, amounting to \$2,342,596.10, and appropriations for extinguishment of mining investments, amortization of patents, depreciation of other properties and accruing renewals, \$4,377,000, leaving as net income for the year \$17,762,812.61, as compared with \$5,590,020.18 for 1914.

The orders on hand Dec. 31, 1915, amounted to \$175,432,895.19, against \$46,513,189.95 on the corresponding date in 1914.

The average number of employees in the corporation's plants in the United States in 1915 was 22,064, against 15,586 in 1914. Wages paid in 1915 amounted to \$21,800,664.19, against \$14,312,948.78 in 1914.

PLANTS NOW AT FULL CAPACITY EXCEPT ARMOR PLATE

The joint statement of Charles M. Schwab, chairman of the board, and E. G. Grace, president, says that the corporation's plants are working to full capacity except in the armor-plate department. From this statement the following extracts are taken:

"At the beginning of 1915 the steel business of the United States was much depressed, due to some extent to the European war. This condition was rapidly changed, however, by the very large orders for steel products placed in this country by the various European governments and by an increased demand for domestic consumption. This combined foreign and domestic demand has created an unusual condition in the steel industry, and to-day there exists an actual shortage of steel-making capacity in this country. These conditions, coupled with the difficulty of obtaining certain raw materials and an increase in the price of labor, have resulted in a rapid increase in the price of steel products.

"As is well known, your corporation has had, for many years, well-developed organizations and plants for the manufacture of ordnance and munitions of war. The resulting ability to meet and supply the extraordinary demand for such products accounts in large degree for the increase in earnings over the previous year.

"With the recent extraordinary market for all classes of steel products and for ships the various plants of your corporation enter the year 1916 with all departments, with one exception, running at full capacity. That exception is the armor-plate department. The Bethlehem Steel Company has practically completed deliveries to the Government on all pending armor contracts. Contracts for the current year have not been awarded.

THE PROPOSED GOVERNMENT ARMOR PLANT

"Your attention is called to the fact that a bill is pending in Congress and has, with the support of the Secretary of the Navy, been recommended for passage by the Senate Committee on Naval Affairs, providing for the building by the Government, at an expense of \$11,000,000 of an armor plant with a capacity of 20,000 tons a year.

"This capacity provides for more than double what have been the average actual requirements of the United States for armor over the last twenty years, and if such a bill is passed the value of existing armor plants in this country will be virtually destroyed. The Bethlehem Steel Company has more than \$7,000,000 now invested in its plant, devoted to this use, and useless for any other purpose.

"Recognizing that though the interests of your property should be carefully conserved by your officers, on a matter of this kind, your corporation also has an important obligation to the nation of which it is a citizen, your officers have appeared before the Senate Committee on Naval Affairs and urged the defeat of the pending measure. As it is frankly declared that the sole purpose of the proposed enterprise is that the Government may secure its armor at a lower price, your officers have submitted the following proposition to the Federal Government:

A FAIR PROPOSITION TO THE GOVERNMENT

"We will agree to permit any well-known firm of chartered public accountants to inventory our plant and make careful estimates of the cost of manufacture; with that data in hand we will meet with the Secretary of the Navy and agree to manufacture armor at a price which will be entirely satisfactory to the Secretary of the Navy as being quite as low as the price at which the Government could possibly manufacture armor on its own account, after taking into account all proper charges. As a concrete working basis for such negotiations the Bethlehem Steel Company has offered to manufacture one-third of the armor plate required for the contemplated five-year naval program (estimated at approximately 120,000 tons) for a price of \$395 per ton for side armor, as compared with the price of \$425 per ton now obtaining.

"It may be added that, while all other steel prices have greatly increased, the foregoing figure at which we now offer to make armor for the United States is not only a lower price than has been paid by the Government for more than ten years, but it is also a substantially lower price than is paid for armor by Japan, Austria, Germany, France, or England.

THE PECULIAR POSITION OF THE GOVERNMENT

"The Bethlehem Steel Company entered upon the manufacture of armor plate at the request of the United States Government. It has during all these years cooperated with the Government to the end that the United States should have the benefit of the highest development of the art.

"Altogether aside from the financial interests of your corporation we, as citizens, and in the light of our experience, should regard it as extremely unfortunate if the United States should enter upon a policy which should prevent there being placed continuously at its disposal in this important detail of national defense the experience, the enterprise and the initiative of the steel manufacturing industry of the country.

"Assuming that manufacturers are willing to accept as low a price as the Government may properly exact, we earnestly hope that Congress will not feel it necessary to embark upon the proposed policy.

PURCHASE OF THE PENNSYLVANIA STEEL COMPANY

"Since the close of the fiscal year covered by this report, but prior to this writing, agreements have been executed under which it is proposed that the Bethlehem Steel Company or a subsidiary company shall acquire all the assets of the Pennsylvania Steel Company (of Pennsylvania) and Maryland Steel Company and all the other assets of the Pennsylvania Steel Company (of New Jersey) for \$31,941,630, subject to existing liens except the \$8,500,000, face value, of bonds of the Pennsylvania Steel Company (of New Jersey), which are to be retired out of the proceeds of this sale. The liens, subject to which the properties are to be purchased, aggregate approximately \$17,300,000. This purchase brings to your corporation plants already in operation that will take the place of those which for some time your officers and directors have been planning to construct."

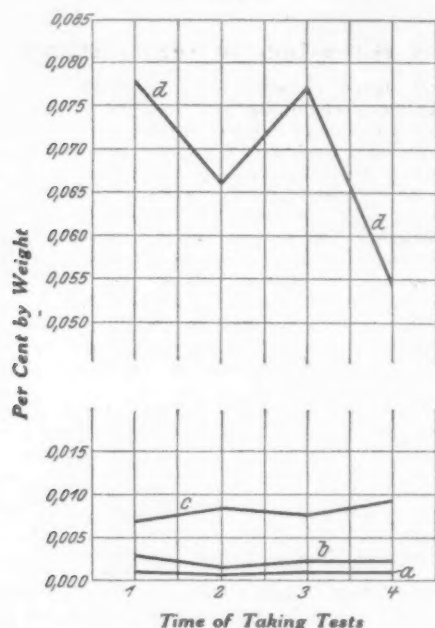
Fire did considerable damage at the rolling mill of the Highland Iron & Steel Company, Terre Haute, Ind., maker of bar iron.

The Determination of Gases in Steel

Results Obtained by a New Method as Applied to Various Kinds of Steel and to Different Stages in Steel Making Processes

A new method for the determination of gases in steel by Goerens and Paquet is described in *Stahl und Eisen*, and some results are given. This method aims to obviate the chief defects of previous ones, and consists in melting the steel to be examined in a vacuum with tin and antimony, and determining the gases set free. An electric resistance furnace is

similar to the well-known Orsat. Special attention should be directed to the obtaining of clean drillings, for naturally this is very important, and due to the irregular distribution of gases in steel drillings should be taken through the whole section. Three grams are melted with 3 grams of gas-free tin (Kahlbaum) and 3 grams gas-free antimony (also Kahlbaum). The mixture is heated high enough so that the whole is uniformly liquid, which takes place when the built-in pyrometer registers 1100 deg. C. The time for a test, including the analysis of the gases, usually takes three hours. When working with the same material the results obtained lie within the allowable limits of experimental error.



Gas Curves with Open-Hearth Process. 1. After melting. 2. Before deoxidation. 3. After deoxidation. 4. After rolling. a. Hydrogen. b. Nitrogen. c. Carbon dioxide. d. Carbon monoxide

used for melting, and a magnesia crucible previously heated to a high temperature and made free from gases.

The apparatus used for analyzing the gases is

GASES IN VARIOUS KINDS OF STEEL

In the table are given results obtained on rolled and forged samples of many kinds of steel. They are arranged according to increasing gas contents. A good measure is the total number of cubic centimeters per 100 grams of steel. The lowest result was obtained with a low carbon electric steel, and such well deoxidized steel has 10 to 15 c.c. per 100 gr. metal. High carbon electric steel in general contains more gas, but the amounts are not proportional to the carbon. Low carbon basic-Bessemer and open-hearth steel show average amounts, 22 to 78 c.c. per 100 gr. A comparatively high gas content, strangely enough, was found in a crucible steel, 152 c.c. per 100 gr., but this result cannot be taken as standard because the steel tested was admittedly defective.

The carbon dioxide varies from 0.002 to 0.02 per cent by weight. The amount of this gas found depends to some extent on the way in which the determination is carried out, so the figures given do not allow definite conclusions to be drawn. The carbon monoxide also varies within wide limits, from

| Table of Gas Contents of Various Steels | | | | | | | | | | | | | |
|---|------------------|----------------------|-----------------------|-------------------|-------------------|------------------|---------------------|-----------------------------|-----------------|--------|--------|--------|--------|
| Test No. | Analysis | | | | | | | Per Cent by Weight | | | | | |
| | Carbon, Per Cent | Man-ganese, Per Cent | Phos-phorus, Per Cent | Sulphur, Per Cent | Silicon, Per Cent | Nickel, Per Cent | Chro-mium, Per Cent | Gas per 100 g. Material cc. | CO ₂ | CO | H | N | Total |
| (a) Low Carbon Basic Bessemer | | | | | | | | | | | | | |
| 1 | 0.05 | 0.36 | 0.11 | 0.045 | ... | ... | ... | 22 | 0.0040 | 0.0196 | 0.0003 | 0.0029 | 0.0268 |
| 2 | 0.08 | 0.40 | 0.08 | 0.048 | ... | ... | ... | 40 | 0.0090 | 0.0352 | 0.0006 | 0.0025 | 0.0383 |
| 3 | 0.05 | ? | 0.08 | 0.040 | ... | ... | ... | 41 | 0.0077 | 0.0342 | 0.0006 | 0.0065 | 0.0413 |
| 4 | 0.05 | 0.40 | 0.08 | 0.040 | ... | ... | ... | 49 | 0.0061 | 0.0393 | 0.0006 | 0.0122 | 0.0521 |
| (b) Low Carbon Open Hearth | | | | | | | | | | | | | |
| 5 | 0.08 | 0.40 | 0.05 | 0.030 | ... | ... | ... | 38 | 0.0048 | 0.0341 | 0.0005 | 0.0061 | 0.0455 |
| 6 | 0.15 | 0.37 | 0.06 | 0.060 | ... | ... | ... | 46 | 0.0048 | 0.0410 | 0.0009 | 0.0024 | 0.0443 |
| 7 | 0.08 | 0.44 | 0.04 | 0.037 | ... | ... | ... | 78 | 0.0178 | 0.0785 | 0.0007 | 0.0020 | 0.0812 |
| (c) Electric Steel | | | | | | | | | | | | | |
| 8 | 0.19 | 0.50 | 0.020 | 0.012 | 0.42 | ... | ... | 10 | 0.0047 | 0.0061 | 0.0002 | 0.0015 | 0.0125 |
| 9 | 0.08 | 0.35 | 0.010 | 0.010 | 0.09 | 4.34 | 1.10 | 13 | 0.0052 | 0.0015 | 0.0007 | 0.0000 | 0.0104 |
| 10 | 0.10 | 0.38 | 0.011 | 0.010 | 0.07 | 3.30 | ... | 15 | 0.0064 | 0.0061 | 0.0007 | 0.0000 | 0.0132 |
| 11 | 0.15 | 0.49 | 0.011 | 0.012 | 0.45 | ... | ... | 25 | 0.0058 | 0.0092 | 0.0012 | 0.0048 | 0.0210 |
| 12 | 0.26 | 0.43 | 0.063 | 0.023 | 0.015 | ... | ... | 25 | 0.0053 | 0.0098 | 0.0012 | 0.0041 | 0.0214 |
| 13 | 0.10 | 0.40 | 0.010 | 0.012 | 0.10 | ... | ... | 28 | 0.0053 | 0.0207 | 0.0008 | 0.0019 | 0.0287 |
| 14 | 0.45 | 0.38 | 0.018 | 0.022 | 1.27 | ... | ... | 32 | 0.0058 | 0.0167 | 0.0013 | 0.0042 | 0.0280 |
| 15 | 0.98 | 0.45 | 0.153 | 0.075 | 0.015 | ... | ... | 70 | 0.0043 | 0.0688 | 0.0010 | 0.0083 | 0.0824 |
| 16 | 0.71 | 0.37 | 0.018 | 0.016 | 0.23 | ... | ... | 73 | 0.0106 | 0.0684 | 0.0010 | 0.0078 | 0.0878 |
| 17 | 1.35 | 0.44 | 0.020 | 0.015 | 0.19 | ... | 0.37 | 88 | 0.0053 | 0.0851 | 0.0010 | 0.0141 | 0.1055 |
| 18 | 0.10 | 0.35 | 0.009 | 0.008 | 0.17 | 3.62 | 0.90 | 94 | 0.0018 | 0.0569 | 0.0047 | 0.0012 | 0.0646 |
| 19 | 1.16 | 0.38 | 0.017 | 0.016 | 0.18 | ... | ... | 94 | 0.0050 | 0.0900 | 0.0011 | 0.0124 | 0.1085 |
| 20 | 0.33 | 0.38 | 0.026 | 0.016 | 0.10 | 3.06 | 1.94 | 105 | 0.0109 | 0.0708 | 0.0039 | 0.0056 | 0.0912 |
| (d) Crucible Steel | | | | | | | | | | | | | |
| 21 | 0.38 | 0.26 | 0.056 | 0.021 | 0.19 | Ni | Wo | 29 | 0.0090 | 0.0248 | 0.0004 | 0.0024 | 0.0366 |
| 22 | 0.84 | 0.36 | 0.041 | 0.017 | 0.15 | ... | ... | 41 | 0.0058 | 0.0391 | 0.0007 | 0.0015 | 0.0471 |
| 23 | 0.16 | 0.44 | 0.008 | 0.008 | 0.29 | 4.0 | 0.91 | 50 | 0.0032 | 0.0271 | 0.0022 | 0.0053 | 0.0378 |
| 24 | 0.47 | ... | 0.020 | 0.028 | ... | 2.98 | 1.29 | 51 | 0.0200 | 0.0257 | 0.0016 | 0.0068 | 0.0541 |
| 25 | 0.97 | 0.14 | ... | 0.010 | 0.12 | ... | ... | 79 | 0.0098 | 0.0712 | 0.0017 | 0.0020 | 0.0847 |
| 26 | 0.27 | 0.45 | 0.010 | 0.012 | 0.24 | 4.0 | 1.30 | 152 | 0.0096 | 0.1290 | 0.0041 | 0.0082 | 0.1569 |

0.0015 to over 0.1 per cent. A high carbon monoxide content is generally a proof that the deoxidation was not complete. In the case of the carefully made chrome-nickel steel, No. 9 in the table, for example, the carbon monoxide, CO, was only 0.0015 per cent. Also the addition of ferrosilicon, which serves to alleviate the formation of carbon monoxide during deoxidation, does not insure a gas-free or carbon-monoxide-free material, as may be seen from samples 18, 21 and 26 in the table.

The hydrogen varies from 0.0002 to 0.0047 per cent. Carefully prepared and well deoxidized low-carbon steel contains little hydrogen as a rule; often its amount depends to a large extent on the charge. The nitrogen varies from nothing to 0.0141 per cent, but as it was determined by difference, and therefore carries all the errors of determination of the other gases, very careful tests will still have to be made before anything further can be said.

TESTS DURING DIFFERENT STEEL-MAKING PROCESSES

Tests were also made at various stages of the basic Bessemer and open-hearth processes. With the former four tests were taken from two heats, test 1 immediately before the deoxidation, test 2 while casting the first ingots, test 3 while casting the sixth ingots, and test 4 of the rolled material. The carbon monoxide shows the most important changes, 0.01 per cent in test 1, 0.059 in test 2. During pouring there is a slight decrease showing that in this time there is constant action between the oxides and the carbon monoxide. During the stay in the soaking pits and during rolling, further amounts of gas escape, so that after the rolling the CO has dropped to 0.025 per cent., which is still higher than before the deoxidation.

The results with the open-hearth tests are shown in the illustration which gives the average of two heats. Test 1 was taken when the bath was clear melted, test 2 immediately before deoxidation, test 3 while pouring the first ingots and test 4 from the rolled material. The important difference between the two processes is that at the end of the operation before deoxidation the Bessemer metal contains very little, but the open-hearth considerable gas, probably because the nitrogen blowing through the metal carries the carbon monoxide with it.

The results with the electric furnace process show the possibility of obtaining very low percentage of gases if sufficient time and care is taken. Not enough tests have been made, however, to compare the different processes.

G. B. W.

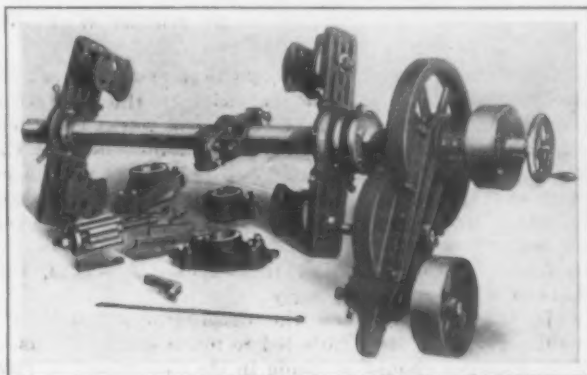
International Harvester Profit Sharing

The plan put into effect last December by the International Harvester Company for the encouragement of thrift among its employees, and which is intended to lead to a sharing in profits through the acquisition of stock, has been splendidly received by them. The number of those subscribing for profit-sharing certificates on March 1 exceeds 20,000, or 70 per cent of the total number of employees. The certificates are paid for in installments of \$1 to \$25 a month, deducted from their salaries, and are exchangeable for stock at less than market prices. In addition to the dividends, the employees who subscribed will receive at the end of each year a bonus equal to 1 per cent of their salaries.

As a part of the plan for the purchase of E. & T. Fairbanks & Co., St. Johnsbury, Vt., scale manufacturers, by Fairbanks, Morse & Co., who have been Western agents for the former for the past 50 years, the capital of the latter has been increased from \$1,000,000 to \$4,000,000, divided equally as common and 6 per cent preferred stock.

Boring Bar for Engine Cylinders

A portable boring bar for cylinders and valve seats equipped with a back geared two-speed drive has been placed on the market by E. J. Rooksby & Co., 431 North Eleventh Street, Philadelphia, Pa. These bars, which are made in a number of sizes ranging from 2 to 8 in.



A Portable Boring Bar for Cylinders and Valve Seats of All Kinds Equipped with a Back Geared Two-Speed Drive

in diameter, are intended to do their work at the plant and with the cylinder or valve seat in position. In addition to being used for the cylinders and valve seats of steam and internal combustion engines, ammonia and air compressors, hydraulic presses and pumps and steam hammers, it is also possible to rebores pedestal bearings, flywheels, large pulleys, crankpin holes, etc. In the design of the bar an effort has been made to guard all exposed gears and moving parts as completely as possible.

The machines are of the two-head type and use high-speed cutters. An automatic feed box provides two changes in the rate at which the cutter head is fed into the work. The gears are incased and the variation in the rate of feed is controlled by a slip pin. The power is applied to the bar by a back geared arrangement having a two-speed quick change gear drive. This arrangement, it is pointed out, is advantageous when cylinders and valve seats of different diameters are rebores by the same bar. As was the case with the feed the change is secured by pulling out a slip pin, thus shifting the primary pinion out of mesh and driving from the intermediate shaft. These gears are also protected.

The bar can be used for reboring cylinders with either one or both heads. The cylinder head studs are employed to fasten the crosshead blocks to the cylinder and the bar revolves in the sleeves supported and centered by set screws in the crossheads. When one head has been removed, an expanding chuck and pin, having five sets of tapered gibs to fit various diameters of stuffing boxes, is employed to support the crank end of the bar. When Corliss valve seats are being rebores, an arrangement consisting of a set of tapered cone sleeves, which are split into halves, is used. These fit in the valve seats and are relied upon to keep the bar in a central position while the blocks and crossheads are being bolted up. When the bar is set up the cone sleeves are removed and the bar is ready for use.

The American Association of Engineers announces that it has signed a five-year lease for suite 601-604 at 29 South LaSalle Street, Chicago. This is the second time in nine months that the new society has been compelled to enlarge its quarters. It has now a membership of 500, of which 65 per cent is in and near Chicago and the remaining 35 per cent is scattered throughout the United States, Canada, England, Philippine Islands and even in South America.

The A. Geisel Mfg. Company, sheet metal goods, St. Louis, announces that its plant, which was partially destroyed by fire, has been completely reconstructed and all departments are again in operation.

Nick and Break Test in Rail Inspection*

An Investigation at the Algoma Mill—
Fewer Rails Rejected, but Defects Are Lo-
cated Which Usual Inspection Would Pass

—BY ROBERT W. HUNT AND C. W. GENNET, JR.—

Steel metallurgists will recall that prior to the general dependence upon the services of the analytical chemist, in the days when but few steel works had their own laboratories, the grading of crucible steel in the ingot and before it was drawn down into bars was based upon the appearance of the fracture of each separate ingot. After the ingots became cold, a piece was broken off one corner and an expert workman judged of the hardness of the metal by the exposed fracture, and marked the ingot accordingly.

In later years, when the dissatisfaction with the results given by steel rails led to much discussion as to what changes should be made in the specifications governing their manufacture, the Rail Committee of the American Railway Association called in consultation the late William Metcalf, past president of the American Institute of Mining Engineers, 1881, and past president of the American Society of Civil Engineers, 1898-99, and for years a steel maker. Previous to that time, drop tests of pieces of rail representing each heat of steel had been included in some of the specifications, but the object of such tests had been limited to determining the ductility of the steel. There had not been any prescribed breaking tests with a view of disclosing the internal structure of the rail.

Mr. Metcalf, no doubt, judging from his experience as a maker of crucible steel, urged that the then current testing did not go far enough, and that several pieces of rail from each heat should be broken, and by the disclosed fractures the rails from that heat accepted or rejected. The committee, when reporting, did not adopt his suggestions, but, based largely upon his insistence that the drop testing as then conducted did not go far enough, many railroad engineers gradually enlarged the scope of their drop-testing requirements until it became the general practice to break, say, three pieces from each heat of open-hearth steel and to accept or reject certain rails according to whether or not interior defects were revealed. It was argued that the practice should be extended to include the breaking of a piece of rail from the top end of each ingot rolled, and in fact some experimental rollings were made under such provisions, but opposition to the plan of making this fracture test on a piece of rail from each ingot developed among rail makers, with the result that what seems to us to be a perfectly logical method of testing rails to insure against acceptance of defective material failed to have a fair working trial; and thus it remained, about a year ago, for the Algoma Steel Corporation, whose mill is at Sault Ste. Marie, Canada, to open the door commercially to the possibilities of a specification for rails, marking, we believe, a distinct step forward in the direction of safer and better wearing rails.

TESTS OF CANADIAN PACIFIC RAILS

A contract for 10,000 tons of rails made by the Canadian Pacific Railway with the Algoma Company was the first to require what has been commonly termed "the nick and break test on each ingot," and this was quickly followed by others, for rails to be shipped to this country under similar conditions of testing. In justice to the Algoma Company it may be said that they have become so appreciative of the logic, as well as the economy, of the nick and break test that they have seen fit to have it incorporated freely and without extra compensation in many of their specifications. One contract for rails to be shipped to one of the leading railroads of the Middle West was given special attention at the time of rolling, and it is essentially the results obtained in that instance that we desire to

record, at the same time drawing attention to various phases of the matter of specifications and their application and interpretation.

The contract in question covered a large tonnage of 90-lb. American Railway Association type "A" section of rail, the dimensions of which are as shown in Fig. 1. The specifications under which the rails were rolled was that adopted March 17, 1915, by the American Railway Engineering Association, but so modified in detail as to provide for nicking and breaking the top crop end of the top rail of each ingot rolled, and accepting or rejecting it (with the subsequent ones of the same ingot) as a result of conditions revealed by the fracture produced. The important requirement of this specification in which it departs from the present American Railway Engineering Association specification is described in the following clause:

(g) The test pieces which have successfully withstood the drop test and also a piece representing the top end of all other top rails shall be nicked and broken. If the fracture shows interior defect the "A," or top rail of the ingot, shall be rejected, and a piece cut from its bottom end to represent the "B," or second rail of the same ingot. This piece shall then be nicked and broken, and if its fracture shows interior defect, the rail represented shall be rejected. The testing by nicking and breaking shall proceed progressively in this manner on all the rails of each ingot, if necessary, and they shall be accepted or rejected according as the fracture of the test piece representing them shows interior defect.

Note.—Each rail must be stamped with a number to indicate the ingot from which it was rolled, so as to permit of identification with the other rails of the same ingot.

RESULTS UNDER BOTH SPECIFICATIONS

One of the most important questions that has been raised in connection with the nick and break test specification is with regard to the relative number of rejections occurring under it and some other, particularly the American Railway Engineering Association specification, above quoted. That this point might be solved,

| Comparison of Results Under Two Specifications | | |
|--|------------------------------|------------------------|
| | Nick and Break Specification | A.R.E.A. Specification |
| Number of rollings..... | | 10 |
| Number of heats rolled..... | | 1,002 |
| Number of ingots rolled..... | | 16,297 |
| Number of rails rolled..... | | 69,826 |
| Number heats rejected at drop test..... | 0 | 0 |
| Number heats of "A" rails rejected at drop test..... | 15 | 15 |
| Number "A" rails rejected at drop test..... | 267 | 267 |
| Number "A" rails in addition rejected account pipe..... | 934 | 2,393 |
| Number "A" rails in addition rejected account segregated..... | 839 | 1,189 |
| Number "A" rails in addition rejected account other reasons..... | 12 | 0 |
| Total "A" rails rejected..... | 1,773 | 3,582 |
| Number "B" rails in addition rejected account pipe..... | 31 | 28 |
| Number "B" rails in addition rejected account segregated..... | 7 | 11 |
| Number "B" rails in addition rejected account other reasons..... | 0 | 0 |
| Total "B" rails rejected..... | 38 | 39 |
| Number "C" rails in addition rejected account pipe..... | 3 | 0 |
| Number "C" rails in addition rejected account segregated..... | 0 | 0 |
| Number "C" rails in addition rejected account other reasons..... | 0 | 0 |
| Total "C" rails rejected..... | 3 | 0 |
| Total all rails rejected on fracture..... | 1,816 | 3,621 |
| Total all rails rejected on physical test..... | 2,083 | 3,888 |
| Per cent rails rolled and rejected on test..... | 2.98 | 5.56 |
| Total rails rejected account pipe..... | 968=1.4% | 2,421=3.4% |
| Total rails rejected account segregated..... | 836=1.2% | 1,200=1.7% |
| Total rails rejected account other reasons..... | 12=.01% | 0=0% |

record was made of each condition that did actually occur, with corresponding conditions, in so far as possible, that would have occurred had the nick and break

*From a paper read before the American Railway Engineering Association at Chicago, March 21, 1916.

test on each ingot been waived and the straight American Railway Engineering Association specification applied. The comparison of the results is shown in the accompanying table.

CONCLUSIONS SUGGESTED BY RESULTS

The most important facts and conclusions which can be deduced from the above table are:

1. That the application of the nick and break test specification results in a distinct saving to the mill in the number of rails rejected as against those that would be rejected under the American Railway Engineering Association specification. These rejections have been reduced from 5.56 per cent to 2.98 per cent, resulting, therefore, in a saving to the mill of rejected rails amounting to 46.4 per cent.

2. That the application of the nick and break test specification is of greater protection to the railroad than would be the American Railway Engineering Association specifications, for the rejections under the former include 1.33 per cent of the total number of rails rolled, which would have been accepted under the American Railway Engineering Association specification. Thus, of the total number of rails rejected under the nick and break specifications, 44.6 per cent would not have been rejected under the American Railway Engineering Association specification, so that practically one-half of the rails rejected under the nick and break test specification would have been accepted under the American Railway Engineering Association, and obviously been laid in the track. In support of this conclusion the following observations are tabulated:

| Number of Rails Rejected Under Nick and Break Specification Which Would Have Been Accepted Under A. R. E. A. Specification | | | | |
|---|-----------|-----------|-----------|-------|
| | "A" Rails | "B" Rails | "C" Rails | Total |
| Piped | 409 | 21 | 2 | 432 |
| Segregated | 492 | 3 | 0 | 495 |
| Other reasons | 3 | 0 | 0 | 3 |
| Total | 904 | 24 | 2 | 930 |
| Per cent of rails rolled that were rejected under the nick and break specification that would have been accepted under the A. R. E. A. specification..... | | | | |
| | | | | 1.33 |

3. If, as has been shown by published records, the number of rails which fail in service and have to be replaced because of unsound or unhomogeneous metal, represents nearly one-half of the total number of failures occurring on the railroads each year, obviously, then, by the application of the nick and break test specification, which is a protection against unsound and unhomogeneous metal, a material reduction in the number of these rail failures easily would be effected.

THE INGOT AS A UNIT FOR OBSERVATION

To our minds a serious defect of most specifications is the disregard for the individuality of each ingot cast from a heat. Large heats and large ingots, at present so common to modern mill practice, aggravate conditions which in the old days of Bessemer steel were not so important, and while it is the usual practice to select drop test pieces from three different ingots from an open-hearth heat, still it often happens that the three selected are what might be termed good ingots as against some others cast from the same heat which are not. Specifications usually control the location in the heat of the ingots from which pieces of rail are to be taken for drop tests, which may lead to special care in the casting of those particular ingots, thus preventing them from being truly representative ones, and tending toward many a defective rail being accepted and put into service, a condition which frequently would be averted, if the prescribed test had been made on a piece of rail from some other ingot of the heat. As illustrative of the efficacy of the nick and break test specification in eliminating some of the bad rails referred to, Fig. 2 is given. It shows fractures made on an "A" or top rail of an ingot which was so located in the heat that under no ordinary specification would it have been selected for test purposes. Careful examination of the sawed ends of the rail failed to detect any signs of a pipe, yet as will be seen from the photograph, the rail was piped, and very badly so, for about 10 ft.

of its length. There can be no question that this rail, under ordinary circumstances, would have been accepted and ultimately laid in the track on practically any railroad of the United States, but under the nick and break

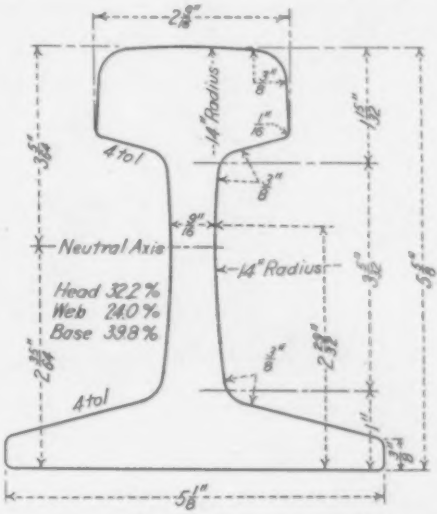


Fig. 1—The 90-lb. A. R. A. Type "A" Rail Rolled for the Illinois Central Railroad under Nick and Break Test Specifications

test specification, by which each ingot is virtually considered a unit by itself, the crop end of this rail was found piped and the rail was rejected.

DISPARITY IN REJECTIONS ANALYZED

The reasons for the disparity in the number of rails rejected under the two specifications are plainly shown by the results obtained on two different heats selected at random from among those rolled:

| Ingot No. | HEAT X | | | HEAT Y | | |
|-----------|------------------------------------|--------|--------|------------------------------------|--------|--------|
| | Fracture of Nick and Break Test on | | | Fracture of Nick and Break Test on | | |
| | A Rail | B Rail | C Rail | A Rail | B Rail | C Rail |
| 1 | O. K. | | | O. K. | | |
| 2 | O. K. | | | Piped | Piped | O. K. |
| 3 | *O. K. | | | O. K. | | |
| 4 | O. K. | | | *O. K. | | |
| 5 | O. K. | | | Piped | O. K. | |
| 6 | O. K. | | | O. K. | | |
| 7 | O. K. | | | *O. K. | | |
| 8 | O. K. | | | Piped | O. K. | |
| 9 | O. K. | | | O. K. | | |
| 10 | O. K. | | | *O. K. | | |
| 11 | O. K. | | | O. K. | | |
| 12 | O. K. | | | O. K. | | |
| 13 | *Piped | O. K. | | Segreg. | O. K. | |
| 14 | *O. K. | | | Segreg. | O. K. | |
| 15 | O. K. | | | O. K. | | |
| 16 | O. K. | | | O. K. | | |
| 17 | | | | O. K. | O. K. | |
| 18 | | | | Piped | | |
| 19 | | | | O. K. | | |
| 20 | | | | O. K. | | |

*Refers to what would have been the regular drop test pieces under the American Railway Engineering Association specification.

Thus, on heat X, piece No. 13 was piped, and under the American Railway Engineering Association specification, therefore, a total of 16 rails would have been condemned as against the single one lost under the nick and break test specification. On heat Y, the three regular American Railway Engineering Association test pieces were good in all respects, and yet 4 "A" rails and 1 "B" rail actually were piped, while 2 other "A" rails were segregated, and, therefore, 7 defective rails would have been accepted and put in service under the American Railway Engineering Association specification, but all were rejected under the nick and break test specification.

CONDUCTING INSPECTION IN THE MILL

By the nick and break test is meant, first, the nicking, and second, the breaking, by some mechanical means, of a short length of rail selected as required by the specification. This, it will be noted, must be, for the first or the original test the top end of the top rail of each ingot rolled, and naturally for this sample the crop end, which must be cut by the hot saws from the top of the "A" rail, was used. These crop ends were

ordinarily from 18 in. to 24 in. long, and after being stamped with the heat and ingot number, to permit of identification, were allowed to cool for a little over 30 minutes, and were then quenched in water, pains being taken to insure quenching from a temperature color of near black or natural cold steel, so as to render no appreciable change in steel structure possible. Then the pieces were nicked as desired, and, for the purpose of breaking, inserted in a specially designed anvil of a

series of special tests were made, the idea in mind being to examine fractures made in rails which had been accepted under the specification, and which, therefore, represented conditions occurring farther down from the top of the ingots where it might be presumed secondary pipes or possible segregation could exist. (Paper describes tests in detail.) These special tests are fairly convincing of the fact that the fracture examined under the nick and break test specification is

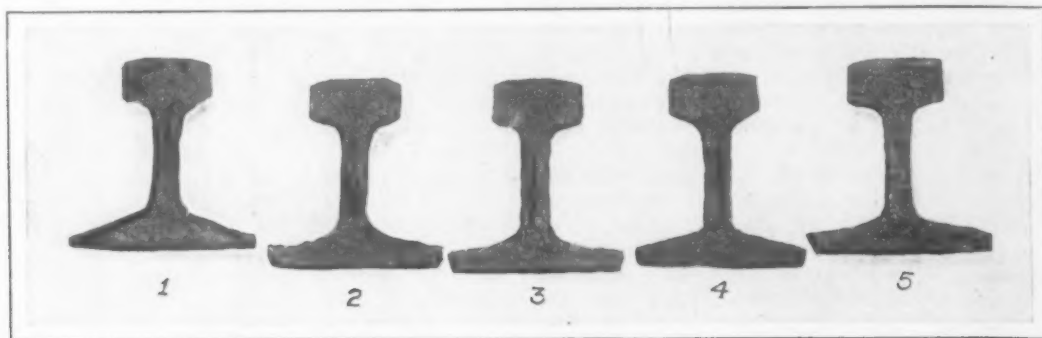


Fig. 2—Showing the Efficacy of the Nick and Break Test

The crop end of an "A" rail from an ingot so located in a heat that under no ordinary specification would it have been selected for drop testing, was regularly tested by nicking and breaking. It showed a large pipe which caused rejection of the "A" rail. The regular drop tests and their fractures of the heat represented were satisfactory in every respect. The "A" rail was then carefully examined, especially on its ends, and no sign of pipe was found, the hot saw marks probably obliterating signs of the pipe. Under customary specifications, the rail would therefore have been accepted and ultimately laid in track. The rejected rail was then broken into short pieces with the results shown.

1. Shows original nick and break test fracture which was piped. 2. Shows a fracture 2 ft. 9 in. from the top end of the "A" rail which was also piped. 3. Shows a fracture 6 ft. 8 in. from the top end, also piped. 4. Shows a fracture 9 ft. 8 in. from the top end, also piped. 5. Shows a fracture 12 ft. from the top end and clear signs of interior defect.

Other fractures at greater distances from the top end showed no signs of interior defects, so that this rail was actually piped for about 30 per cent of its length.

bulldozer, so arranged that the ram readily broke the rail where it had been nicked, giving, without trouble in most cases, the square character of fracture desired for examination. Thus the fractures were ready for judging in an average time of about one hour after the rails were rolled, and in many cases long before the actual drop test pieces were cold enough to test, and even before the rails represented had reached the cold straightening presses. It is interesting to observe that the bulldozer actually broke the rails at a rate of about 3 per min., or at a rate, say, of 2000 pieces in twelve hours, and, as each piece represented an ingot, the rate of breaking possible shows it to be well in excess of any probable tonnage that could be rolled with any present mill equipment. In case of the fracture on this original test showing bad, thus incurring the rejection of the top rail of the particular ingot represented, it was necessary to locate that rail in front of the straightening presses by identifying the heat and ingot number and rail letter on it, and from its bottom end to break a piece to represent the second rail of the same ingot. This requirement continued to all of the rails of the ingot as far as necessary, and it was found possible to accomplish the desired end easily. A little care in the distribution in front of the straightening presses of the rails from the hot beds made the identification possible without the necessity of extended searching, and when the particular rail for retest was located, it was marked and in due course taken to the nearest straightening press, where a piece readily was broken from its lower or back end and the fracture scrutinized by the inspector without delay or trouble to the regular operation of the mill. In fact, no greater trouble arose with regard to locating and making the necessary retests than is demanded in any mill when all the top rails of a heat, or even a whole heat, have to be located and identified in order to comply with rejection requirements, a matter of more or less everyday occurrence in some mills.

Among the questions that have been raised, in the discussion of the nick and break test specification, has been that as to how well the fracture of the crop end of the top rail of each ingot predicated the conditions as to soundness and homogeneity, considered in either a chemical or physical sense, which would exist in the rails which were accepted under this specification. For the purpose of investigating this phase of the matter, a

admirably indicative of conditions occurring in the rails directly represented.

COMPARISON WITH PENNSYLVANIA SPECIFICATION

The intent of this specification (adopted by the Pennsylvania lines in 1915, requiring chemical analysis of drillings to disclose segregation not apparent from fracture) is, obviously, to protect against the acceptance of segregated rails, such as are found among those rolled from the top of the ingot. The Pennsylvania practice regarding the physical test pieces is based on the principle that the fracture must show an actual pipe in order for rejection on account of interior defect to be made, it being considered that the above-mentioned chemical stipulations are sufficient to prevent shipment of rails whose fractures might also show segregation. It was but natural that a discussion of the merits of the nick and break test specification versus the Pennsylvania specification would ensue. Questions arose as to whether or not the examination of the fractures obtained under the nick and break test specification for the presence of segregation was sufficient to be used in lieu of the expensive plan adopted by the Pennsylvania, and to thus serve as protection against acceptance of segregated rails.

The findings based upon drillings of the rails, analogous to the Pennsylvania requirements when compared with the acceptances and rejections under the nick and break test, seemingly would show that the nick and break test specification is unreliable on the ground that it is impossible positively to depend on the fractures obtained under it to evidence the question of segregation; and so it would appear that, based on the character of the fracture, some rejections were made that should not have been made; while, on the other hand, some rails were accepted that should have been rejected, bearing in mind, of course, the limitations regarding segregation as adopted by the Pennsylvania specification. Assuming that this was the case, and it is not unreasonable to expect that a few errors would be made in the judging of something like 20,000 fractures, it is worthy of note that the loss of rejected rails to the manufacturer and the additional protection afforded to the purchaser are respectively so little and so great by comparison with the A. R. E. A. specification, as to more than offset any objections raised on this ground. Notwithstanding, we do not believe that the

seemingly paradoxical situation, as forecasted by the comparison referred to, exists to the extent indicated, and we feel confident that a further study of the facts will throw new light on the situation and tend to dispel the presumption of inaccuracy. At the outset we submit that the taking of drillings and the making of analyses from as few as two definitely prescribed locations on the cross-section of a rail do not by any means positively determine the presence of harmful or dangerous segregation.

SEGREGATION

[The paper presents in detail a consideration of the process of segregation in the ingot, from which the conclusion is reached that the cross-section of an ingot, if critically examined chemically, would be found to show largely varying amounts of carbon, phosphorus and sulphur in very small areas, arranged in some manner entirely impossible of predetermination, and dependent on unforeseen and uncontrollable conditions, for which each ingot would of course be a unit unto itself. The question of segregation then as determined by drillings taken, for example, from the corner of the head of a rail and the junction of the head and web, may or may not be representative of the actual conditions, depending upon whether the drills happen to find striæ of the segregating metalloids.]

We had several new nick and break test fractures made on pieces of the original crop ends used by the inspector, and we found that in every case the inspector's judgment as to the appearance of segregation on the fractures was correct. Similarly, the analyses of several pieces were duplicated carefully, with no appreciable difference in the results as above reported.

break test, made as above mentioned, and on which the fine grained metal in the web plainly shows segregation. The analysis of this sample shows that the segregation evidently tapers off near the junction of the head and web so that the drillings taken from the prescribed locations do not reveal the true extent of the segregation as manifested when taking drillings from the center of the web.

With respect to the contrary condition, that is, where the fracture is clear of segregation, but where chemical analysis shows it to exist, attention is directed to Fig. 4, which is also a photograph of an actual fracture as produced by the second nick and break test above mentioned. It is absolutely clear of signs of segregation, but chemical analysis shows it to be segregated to the extent of 40.4 per cent for carbon as between the corner of the head and the junction of the head and web, while the maximum segregation, considering drillings from the center of the web, amounts to 46.1 per cent. The results obtained indicate that the drilled locations happened to contain striations of the segregating elements, particularly carbon, and that the high percentage of carbon exists in such minute areas as to fail to be detected by a close examination of the original fracture.

CONCLUSION

In conclusion, we express the hope that further investigation and study of the cross-sectional results of segregation will be made, and the effects of segregation in rail sections more fully established. We appreciate, of course, the importance of having any accepted test an accurate gage of the degree of segregation that might be harmful to the serviceability of the rails; and, at the same time, based on the observation of the appli-



Fig. 3—Fracture of Sample Rail Showing Segregation in the Center of the Web, but Which Does Not Extend Into the Head

| Pennsylvania Location | Per Cent Carbon by Combustion | |
|--------------------------------------|-------------------------------|------|
| Corner of head..... | 0.637 | |
| Junction of head and web..... | 0.71 | |
| Per cent of segregation..... | | 11.4 |
| Center of web..... | 0.78 | |
| Per cent of maximum segregation..... | | 22.4 |

With respect especially to the pieces representing "A" rails that were rejected on the original nick and break test, it was found that the evidence of segregation seen in the fracture was localized in the area of the web, and plainly did not extend into the head sufficiently to be reached when taking drillings for analyses from the prescribed locations. Thus the Pennsylvania specification would fail to detect segregation in those instances, yet the rails plainly were segregated.

This condition is shown by Fig. 3, which is a photograph of an actual fracture of the second nick and



Fig. 4—Sample Fracture Which Shows Absolutely Clear of Segregation

| Pennsylvania Location | Per Cent Carbon by Combustion | |
|--------------------------------------|-------------------------------|------|
| Corner of head..... | 0.52 | |
| Junction of head and web..... | 0.73 | |
| Per cent of segregation..... | | 40.4 |
| Center of web..... | 0.76 | |
| Per cent of maximum segregation..... | | 46.1 |

cation of the nick and break test to so large a production of rails, we consider that it has clearly established its reliability as a protection against the acceptance of rails having pipes, laps or any interior mechanical defects. We think the nick and break test made on every ingot is a step forward in the testing of manufacture, and insures greater protection to the purchasers of steel rails than is given by any other existing specification; and, at the same time, it conserves the interests of the makers, and is executed with a minimum of expenditure of money.

Discussion

BRADLEY STOUGHTON, NEW YORK: There are two general methods of safeguarding materials for construction which are commonly accepted to-day. The first method is to inspect or test certain specimens chosen more or less at random and then to accept or reject a large amount of material on the basis of the result so obtained. In the case of rejection the amount of material so discarded will represent the size of the factor of safety; in the case of acceptance, the larger the amount accepted on the basis of the one test the smaller is the factor of safety. In either event this method depends chiefly on a more or less scientific process of "taking chances."

The second method of safeguarding is to choose for test certain representative or indicative specimens and to accept or reject only as much material as is actually represented by the test made.

The nick-and-break test described by the authors of this paper is an attempt to follow the second method of safeguarding, and to avoid as far as possible "taking chances" which may result either in causing some good material to be rejected or some poor material to be accepted, as the case may be. We heartily endorse the statement of the authors, that the attempt is a step forward in the testing of manufacture, and that the advantage of regarding each ingot as a unit which must be tested by itself is sound. We also endorse the authors' statement that many unsound and unhomogeneous rails escape the present test and would be rejected by the nick-and-break test.

AIMED AT INGOT DEFECTS

This new test aims to correct the weakest point now remaining in the inspection of steel, namely, the defects arising during and subsequent to the casting of the liquid steel in molds. It is possible to safeguard the manufacture of steel up to the point of teeming it into molds, but it must be admitted that steel which is excellent up to this point may be ruined by conditions arising subsequently and these conditions can, in general, only be determined by a test of each individual ingot. The fact that one ingot or three ingots out of an open-hearth heat containing, say, 20 ingots altogether, were good or bad is only a "hit-or-miss" method of determining the quality of the 17 or 19 other ingots of the same heat.

The defects which may arise during or subsequent to the ingot stage of steel manufacture are:

1. Pipe, which may appear in the rails later in the form of seams, laminations, cavities, etc.
2. Segregation.
3. Coarse crystallization, due to heat treatment.
4. Occluded particles of slag, etc.
5. Combined oxygen.
6. Combined nitrogen.

Of these defects, the most serious ones from the standpoint of the user of railroad rails are the first three, and the nick-and-break test aims to discover the existence of such defects by an examination of the fracture. This point in itself introduces an additional safeguard, because the judging of fractures can be properly done by skilled men only, and the necessity for the employment of men of this class is in itself, indirectly as well as directly, a benefit to the quality of the material. We are all ready to agree that an experienced man can determine accurately many different characteristics of steel by an examination of the fracture; such as, for example, the carbon contents and therefore the segregation of carbon; the previous heat treatment; seams, cracks, cavities, etc. We agree with the authors that experience with this test will increase the accuracy of the results, especially in the matter of segregation.

In applying the nick-and-break test, the top end of the top rail of each ingot is chosen for the test, in the belief that, if this proves to be reasonably free from defects, all of the rails made from this ingot will be at least equally good.

If, however, this top end should be defective, then the first rail from the top of the ingot is rejected and the top end of the next rail is tested and so on down lower and lower in the ingot. This principle seems to be in general sound, but as a further safeguard all

unbroken drop test pieces are nicked, broken and examined.

The authors have presented evidence to show that freedom from these specific defects in the top of the ingot indicates freedom throughout the whole ingot. The results are favorable as far as they go, but it seems to us that the cases tested are too few to enable a positive assertion to be made at present, even in the matter of seams, laminations, etc.

COMPARISON WITH PENNSYLVANIA TESTS

As regards the matter of segregation, the authors have compared the results of the fracture test with segregation as determined by the Pennsylvania specifications, and have shown that of the 25 specimens represented in Table 2, three of the fracture tests disagree with the Pennsylvania test, and 22 agree with it. Of the 26 specimens in Table 3, 16 of the fractures agree with the Pennsylvania test, and 10 disagree. Of the 12 specimens in Table 4, 7 agree and 5 disagree. While this does not indicate that the nick-and-break test is entirely reliable, we believe that the Pennsylvania test itself is unreliable, because it depends upon analyses made at only two points in the cross-section of the rail, and it might well be that these points would not be truly indicative. Indeed, we should be more inclined to trust to the judgment of the skilled and competent inspector of fractures than to analyses made arbitrarily at only two points.

The observations of the authors upon segregation tests longitudinally of the ingot and of the cross-section thereof are borne out by many other authorities. In this connection we call attention especially to pages 131 to 152 and 551 to 556 of a book by Henry M. Howe, which is just off the press, entitled, "The Metallography of Steel and Cast Iron."

It is to be hoped that the publication of this splendid research by Messrs. Hunt and Gennet will rivet attention to the importance of defects in steel ingots and lead to the general adoption of this test, or some other test, aiming to prevent the acceptance of materials containing these defects.

Pennsylvania Industrial Accidents in 1915

The economic waste in lost wages due to industrial accidents in Pennsylvania in 1915 was \$1,997,025, according to a statement issued March 11 by Commissioner John Price Jackson of the Department of Labor and Industry. He declared that workers injured in 20,571 plants lost 820,743 working days as a result of their injuries. That statement is based on data compiled by the bureau of statistics and information of his department, which received reports during the year indicating that 61,540 workers had been injured, including 1204 fatalities. The incompleteness of the accident reports rendered last year is shown by the statement that since the workmen's compensation act became effective reports have been received for January and February, 1916, that 37,940 workers were injured, including 351 fatalities.

Metal plants, mines and public service work exacted the highest toll of life and health of the 18 subdivisions of industry included in the 1915 classification. In metal plants 25,094 were injured, including 212 killed; mines and quarries, 13,955 injured, including 749 killed; public service, 16,919 injured, including 51 killed. Lack of safeguards was responsible for 1023 of the injuries to workers.

The committee of the Pennsylvania Industrial Board which approves safety devices met at Harrisburg, March 21, to consider 30 different mechanical appliances submitted as safety devices. All such devices for use in Pennsylvania must be approved by this committee, of which James C. Cronin is chairman.

A Commercial Safety Device Exhibition is to be a feature of the annual congress in Detroit, Oct. 15 to 21, inclusive, of the National Safety Council. An exhibit committee has been appointed, but for particulars regarding cost of exhibiting and facilities therefor, inquiries are to be addressed to the secretary, W. H. Cameron, Continental & Commercial Bank Building, Chicago, Ill.

United States Steel Corporation's 1915 Report

Gross Receipts Increased \$168,268,656 Over 1914, or 30 Per Cent—Net Earnings Increased \$58,732,396, or Nearly 82 Per Cent

The fourteenth annual report of the United States Steel Corporation, which covers the operations of the year ended Dec. 31, 1915, affords much more cheerful reading for the stockholders than the thirteenth. The operations of 1914 had resulted in a deficit of \$16,971,983, after the payment of the full preferred dividend and only 3 per cent on the common stock. In 1915, after the payment of the full preferred dividend and 14 per cent on the common stock, and the retirement of \$10,669,566 bonded indebtedness, a surplus was left of \$44,260,374. The gross receipts of the year, \$726,683,589, were the third largest in the history of the corporation, 1913 having beaten it by \$70,000,000 and 1907 by \$30,000,000. The shipments to customers of all classes of products except cement in 1915 were 10,982,748 tons, being an increase of 1,272,347 tons on 1914. Prices received in 1915 averaged 26 cents per ton more than 1914 on domestic business and \$4.19 per ton more on export business, the average increase for both domestic and export being \$1.05 per ton. Following is a comparison of the financial outcome of the year with the preceding year:

INCOME ACCOUNT

| | 1915 | 1914 |
|---|------------------|------------------|
| Gross receipts, sales and earnings | \$726,683,589.33 | \$558,414,933.54 |
| Manufacturing cost and ordinary maintenance | 544,352,757.08 | 460,485,849.09 |
| Administrative and general expenses | 19,396,905.42 | 18,419,707.64 |
| Taxes | 13,640,184.56 | 12,646,394.28 |
| Discounts and interest | 3,757,590.15 | 3,272,907.81 |
| Balance | 145,536,152.12 | 63,590,074.72 |
| Sundry manufacturing and operating revenues and rentals | 3,504,226.04 | 234,171.29 |
| Income from investments, etc. | 3,472,790.17 | 3,626,497.57 |
| Total income | 152,513,168.33 | 67,450,743.58 |
| Interest charges subsidiary companies | 9,854,054.69 | 10,082,902.69 |
| Balance | 142,659,113.64 | 57,367,840.89 |
| Net balance profits earned by subsidiary companies | -12,263,102.00 | +14,295,774.28 |
| Net earnings | 130,396,011.64 | 71,663,615.17 |
| Depreciation funds, etc. | 32,428,048.85 | 25,143,207.41 |
| Balance | 97,967,962.79 | 46,520,407.76 |
| Bond interest and sinking fund | 22,899,944.02 | 23,148,617.99 |
| Balance | 75,068,018.77 | 23,371,789.77 |
| Sundry credit adjustments .. | +765,813.94 | +124,978.40 |
| Total available for dividends, etc. | 75,833,832.71 | 23,496,768.17 |
| Preferred dividends paid .. | 25,219,677.00 | 25,219,677.00 |
| Common dividends paid | 6,353,781.25 | 15,249,075.00 |
| Surplus | \$44,260,374.46 | *\$16,971,983.83 |

*Deficit.

CONDENSED BALANCE SHEET

Following is a condensation of the general balance sheet as of Dec. 31, 1915, liabilities from one subsidiary company to another being omitted from both assets and liabilities:

| Assets | |
|--|--------------------|
| Property account | \$1,443,300,765.65 |
| Advanced mining royalties | 17,909,715.90 |
| Mining royalties for which non-interest bearing notes of the subsidiary companies have been issued | 25,955,478.76 |
| Deferred charges (applying to future operations) | 1,805,948.62 |
| Investments | 3,060,459.94 |
| Sinking and reserve fund assets | 19,554,596.44 |
| Inventories, less credit for amount of inventory values representing profits earned by subsidiary companies on inter-company sales | 161,113,900.00 |
| Accounts receivable | 66,308,294.33 |
| Bills receivable | 6,766,818.00 |
| Agents' balances | 934,019.75 |
| Sundry marketable securities | 7,748,059.21 |
| Cash (in hand and on deposit, subject to check) | 94,083,804.54 |
| Total | \$1,848,541,861.14 |

| Liabilities | |
|--|------------------|
| Common stock | \$508,302,500.00 |
| Preferred stock | 360,281,100.00 |
| Outstanding stock of subsidiary companies. Bonded and debenture debt outstanding .. | 587,742.50 |
| Subsidiary companies' non-interest-bearing notes, substituted for previously existing mining royalty obligations | 616,432,705.74 |
| Mortgages and purchase money obligations of subsidiaries | 25,955,478.76 |
| Accounts payable and payrolls | 1,076,448.34 |
| Special deposits or loans due employees and others | 33,064,498.84 |
| Accrued taxes not yet due | 992,187.14 |
| Accrued interest, unrepresented coupons and unclaimed dividends | 9,930,944.85 |
| Preferred dividend No. 59, payable Feb. 28, 1916 | 8,187,998.84 |
| Common dividend No. 45, payable March 30, 1916 | 6,304,919.25 |
| Sundry reserve funds | 6,353,781.25 |
| Appropriated surplus to cover capital expenditures | 36,046,226.89 |
| Surplus, exclusive of profits earned by subsidiary companies on inter-company sales of products on hand in inventories | 55,000,000.00 |
| Total | 180,025,328.74 |

Total \$1,848,541,861.14

The total surplus at the close of 1915 was \$180,025,328.74, which is exclusive of \$20,109,723.39 in the surplus of subsidiary companies, representing profits on sales of materials and products to other subsidiary companies and on hand in the latter's inventories.

CLASSIFICATION OF BUSINESS

The volume of business done by all companies during the year, as represented by their combined gross sales and earnings, equaled the sum of \$726,683,589, as compared with a total of \$558,414,933 in the preceding year. This amount represents the aggregate gross value of the commercial transactions conducted by the several subsidiary companies, and includes sales made between the subsidiary companies and the gross receipts of the transportation companies for services rendered both to subsidiary companies and to the public. The earnings for the year resulting from the above gross business represent the combined profits accruing to the several corporate interests on the respective sales and services rendered, each of which is in itself a complete commercial transaction.

The following is a statement of the gross sales and earnings classified by operating groups, gross sales of products being included on the basis of f.o.b. mill values:

| | 1915 | 1914 |
|--|---------------|---------------|
| By manufacturing, iron-ore and coal and coke companies: | | |
| To customers outside of U. S. Steel organization | \$486,352,054 | \$380,228,143 |
| Inter-company sales (between subsidiary companies) | 178,576,468 | 129,565,729 |
| | \$664,928,522 | \$509,793,872 |
| Transportation and miscellaneous companies: | | |
| Transportation companies | 54,392,457 | 42,040,131 |
| Miscellaneous companies | 7,362,610 | 6,580,930 |
| Total | \$726,683,589 | \$558,414,933 |

*Includes earnings and receipts both for inter-subsidiary company business and of business with interests outside of the U. S. Steel organization.

EMPLOYEES AND PAYROLLS

The average number of employees in the service of all companies in 1915, in comparison with 1914, was as follows:

| | 1915 | 1914 |
|--|-------------|---------------|
| Manufacturing properties | 140,875 | 131,616 |
| Coal and coke properties | 19,485 | 16,155 |
| Iron-ore properties | 9,668 | 11,170 |
| Transportation properties | 18,240 | 17,857 |
| Miscellaneous properties | 2,858 | 2,555 |
| Total | 191,126 | 179,353 |
| Total salaries and wages paid | 176,800,864 | \$162,379,907 |
| Average per employee per day: | | |
| All employees, exclusive of general administrative and selling force | \$2.92 | \$2.88 |
| Total employees, including general administrative and selling force | \$3.01 | \$2.97 |

PRODUCTION FOR THE YEAR

The production of raw, semi-finished and finished products by subsidiary companies in the year 1915, compared with 1914, was as follows:

| Products | 1915 Tons | 1914 Tons |
|--|--------------|--------------|
| Iron ore mined in the Lake Superior Region: | | |
| Mesaba Range | 17,209,664 | 10,894,463 |
| Vermillion Range | 1,273,825 | 1,112,854 |
| Gogebic Range | 1,277,419 | 1,469,601 |
| Menominee Range | 939,304 | 874,909 |
| Marquette Range | 618,108 | 496,896 |
| In the Southern Region: | | |
| Tennessee Coal, Iron & R. R. Company's mines | 2,351,356 | 2,186,258 |
| Total | 23,669,676 | 17,034,981 |
| Limestone quarried | 5,795,925 | 4,676,479 |
| Coal mined: | | |
| For use in manufacture of coke.... | 20,800,204 | 15,890,382 |
| For steam, gas and all other purposes | 5,828,278 | 5,271,911 |
| Total | 26,628,482 | 21,162,293 |
| Coke manufactured: | | |
| In beehive ovens | 9,701,692 | 7,092,792 |
| In by-product ovens | 4,799,126 | 4,081,122 |
| Total | 14,500,818 | 11,173,914 |
| Blast-furnace production: | | |
| Pig iron | 13,517,598 | 9,909,062 |
| Spiegeleisen | 7,175 | 25,397 |
| Ferromanganese and ferrosilicon.... | 116,735 | 117,998 |
| Total | 13,641,508 | 10,052,457 |
| Steel ingot production: | | |
| Bessemer ingots | 5,584,198 | 4,151,510 |
| Open-hearth ingots | 10,792,294 | 7,674,966 |
| Total | 16,376,492 | 11,826,476 |
| Rolled and other finished steel products for sale: | | |
| Steel rails (heavy, light, and girder) | 1,129,832 | 978,907 |
| Blooms, billets, slabs, sheet and tin-plate bars | 1,404,443 | 921,826 |
| Plates | 974,741 | 689,241 |
| Heavy structural shapes | 726,082 | 613,739 |
| Merchant steel, bars, hoops, bands, skelp, etc. | 2,118,366 | 1,423,740 |
| Tubing and pipe | 919,280 | 818,435 |
| Wire rods | 261,036 | 164,153 |
| Wire and products of wire | 1,771,945 | 1,380,376 |
| Sheets (black and galvanized) and tin plates | 1,368,178 | 1,075,419 |
| Finished structural work | 476,896 | 521,225 |
| Angle splice bars and all other rail joints | 190,758 | 129,849 |
| Spikes, bolts, nuts and rivets | 74,289 | 62,133 |
| Axles | 95,476 | 64,662 |
| Steel car wheels | 77,569 | 53,638 |
| Sundry steel and iron products | 173,748 | 117,169 |
| Total | 11,762,639 | 9,014,512 |
| Spelter | 32,031 | 28,031 |
| Sulphate of iron | 35,377 | 30,212 |
| Universal Portland cement | 7,648,658 | 9,116,000 |

SHIPMENTS—DOMESTIC AND EXPORT

The shipments of all classes of products to customers in 1915, in comparison with the shipments in 1914, were as follows:

| Domestic—tons | 1915 | 1914 |
|---|---------------|---------------|
| Rolled steel and other finished products | 9,331,363 | 7,982,325 |
| Pig iron, ingots, spiegel, ferro and scrap | 543,193 | 494,144 |
| Iron ore, coal and coke | 1,004,323 | 1,153,575 |
| Sundry materials and by-products.. | 103,869 | 80,357 |
| Total tons all kinds of materials, except cement | 10,982,748 | 9,710,401 |
| Universal Portland cement (bbl.).. | 8,176,583 | 9,117,752 |
| Export—tons | | |
| Rolled steel and other finished products | 2,350,524 | 1,096,234 |
| Pig iron, ingots and scrap | 78,244 | 47,790 |
| Sundry materials and by-products | 971 | 190 |
| Total tons all kinds of materials | 2,429,739 | 1,144,214 |
| Aggregate tonnage of rolled steel and other finished products shipped to both domestic and export trade | 11,681,887 | 9,078,559 |
| Total value of business (covering all of above tonnage): | | |
| Domestic | \$391,188,661 | \$337,444,052 |
| Export | 95,163,393 | 42,784,091 |
| Total | \$486,352,054 | \$380,228,143 |

The improvement in the demand for iron and steel products which became evident before the middle of 1915 continued in increasing volume throughout the remainder of the year, both for the domestic and the

export trade. In the closing months of the year the demand for products for the domestic trade for future delivery exceeded the producing capacity of the country and caused price advances. During the last quarter of the year the output equaled the maximum steel producing capacity. The demand for products for export was the largest for any year in the history of the corporation.

INVENTORIES

The following is a general classification of the inventory valuations at Dec. 31, 1915, in comparison with the valuations at the close of the preceding year:

| | 1915 | 1914 |
|--|---------------|---------------|
| Iron ores | \$45,532,472 | \$57,374,986 |
| Pig iron, scrap, ferro and spiegel.. | 9,075,586 | 9,314,963 |
| Coal, coke and other fuel | 4,925,090 | 3,460,218 |
| Pig tin, spelter, copper, nickel, aluminum and dross and skimmings | 7,866,748 | 4,396,008 |
| Limestone, fluxes and refractories. | 3,011,134 | 2,545,741 |
| Rolls, molds, stools, annealing boxes, etc. | 6,638,562 | 6,244,415 |
| Manufacturing supplies, stores and sundry items not otherwise classified | 17,343,454 | 14,897,414 |
| Ingots—steel | 1,790,298 | 1,044,090 |
| Blooms—billets, slabs, sheets and tin-plate bars, etc. | 11,658,042 | 8,426,734 |
| Wire rods | 953,535 | 589,587 |
| Skelp | 1,824,779 | 1,171,862 |
| Finished products | 31,091,145 | 31,660,054 |
| Mining supplies and stores (for ore and coal properties) | 2,851,564 | 2,522,018 |
| Railroad supplies and stores | 3,767,177 | 3,809,151 |
| Merchandise of supply companies.. | 674,527 | 675,159 |
| Material, labor and expense locked up in bridge and structural contracts | \$26,510,792 | |
| Less bills rendered on account | 24,514,354 | |
| Stocks abroad and on consignment. | 1,996,438 | 1,424,854 |
| Material in transit | 6,857,423 | 7,380,012 |
| | 3,255,926 | 623,675 |
| Total | \$161,113,900 | \$158,091,036 |

GENERAL

The Duluth plant of the Minnesota Steel Company, which has been in course of construction for several years, was partly placed in operation in December, 1915. Blast furnace No. 1 was blown in Nov. 29, 1915, and four of the open-hearth steel furnaces went into operation in December, the first steel having been made Dec. 11. Steel was rolled on the 40-in. blooming mill Dec. 13 and on the 28-18-in. mill Dec. 23. It is expected the remaining six open-hearth furnaces and the merchant mills will be ready for operation in April, 1916. The Duluth plant, when fully completed, will have an annual capacity of 360,000 tons of finished rolled steel products.

Further expenditures were made in improvement of the site and erection of dwelling houses for employees at Morgan Park, a subdivision adjacent to the Duluth steel and cement plants. There have been completed 169 houses of various types and sizes. The development of the townsite in respect of grading, streets, sewers, lighting, water supply, etc., is substantially completed, but it is probable a considerable number of additional houses will be constructed to provide satisfactory accommodations for employees.

The new cement plant, adjoining the steel plant at Duluth, was substantially completed, and it is expected to commence operations in the spring of 1916. It will have a capacity of 1,500,000 bbl. per annum.

Other important additions and betterments completed during the year by the subsidiary companies were the following:

At Donora, Pa., a large zinc smelting and sulphuric acid plant, having 9120 retorts, constructed in ten units, and three double acid producing units. Buildings cover about 26 acres. Annual capacity will be about 40,000 tons of spelter and 180,000 tons of acid. The output will be used principally by the subsidiary companies in the operations of their steel manufacturing and by-product coke plants.

Facilities for the recovery from coal gases of benzol, toluol and other by-products constructed and placed in operation at the by-product coke plants located at Gary, Ind.; Farrell, Pa., and Fairfield, Ala.

At the Edgar Thomson works of the Carnegie Steel Company, enlargement and improvement of the No. 2 rail mill completed; at Homestead works of the same company, new shop for the manufacture of steel railroad ties constructed, and at its New Castle works a new hot metal mixer building with a 1000-ton mixer installed.

At Christy Park plant of National Tube Company an extension to the hot and cold drawn tube buildings and equipment installed for production of large size tubular forgings and compressed air cylinders. Also purchased additional acreage for future extensions.

At Ensley plant of Tennessee Coal, Iron & Railroad Company, a slag crushing and pulverizing plant for the manufacture of fertilizer completed and started.

A program of new construction and improvement involving the expenditure of a large aggregate sum of money has been authorized. These extensions and improvements are largely for the purpose of economizing in cost of operation through installation of the latest and most modern type of facilities, including the conservation of by-products, and for diversifying lines of finished products. Among the more important appropriations authorized under the foregoing program are the following:

New by-product coke plants at Clairton, Pa., 200 ovens; at Youngstown, Ohio, 210 ovens; at Central furnaces, Cleveland, 180 ovens; and at Lorain, Ohio, 225 ovens.

At Edgar Thomson works a new central pumping station and water distributing system; at Schoen Steel Wheel works, an additional unit increasing the capacity by 150,000 wheels per annum; at Clairton works two additional open-hearth furnaces and a 1200-ton metal mixer; and at Donora works, a new duplexing steel plant comprising two 25-ton converters and a 1300-ton mixer.

At Ohio works, Youngstown, three additional open-hearth furnaces. At McDonald (near Youngstown), a new merchant bar plant, to comprise three bar mills, six hoop mills and one band mill, with auxiliary departments. At Ellwood City, Pa., the Shelby Steel Tube Company will construct a large extension to its Standard works seamless tube plant.

At the Cuyahoga works of American Steel & Wire Company, a new rod and flat wire mill, also additional wire drawing and galvanizing equipment; at Newburgh works, one additional open-hearth furnace. At Lorain works of the National Tube Company, four additional open-hearth furnaces and a 40-in. blooming mill.

At Gary works of Indiana Steel Company, four additional blast furnaces, a duplexing steel plant comprising two 25-ton converters and two 100-ton tilting open-hearth furnaces, a 40-in. blooming mill, a 160-in. sheared plate mill, two 10-in. and one 20-in. merchant bar mills, a forged steel wheel plant, four 3000-kw. electric gas engine units, additional waste heat boilers at open-hearth plants and two 7500-kw. steam turbo-electric units. At the works of American Sheet & Tin Plate Company at Gary, a new tin-plate plant comprising twenty-four hot mills with an annual capacity of 2,250,000 base boxes. At the South works of Illinois Steel Company a duplexing steel plant comprising two 25-ton converters and two 100-ton tilting open-hearth furnaces and six gas-driven blowing engines to replace ten steam engines. At Joliet works a benzol recovery department as an extension to the by-product coke plant.

The estimated total cost of the additions and improvements specifically mentioned above is about \$70,000,000. The total amount unexpended on all authorized appropriations for extensions, additions and improvements at March 1, 1916, was \$91,200,000. It is estimated that not more than \$75,000,000 of this total will be expended in the year 1916.

In addition to expenditures to be made in 1916 on capital account, as above outlined, there will mature during 1916, or will have to be redeemed under sinking fund provisions, \$10,470,000 of bonds of the subsidiary companies and approximately \$6,825,000 of United States Steel Corporation bonds.

On Feb. 1, 1916, an advance was made in the wages and salaries of the employees of the subsidiary companies. This increase averaged approximately 10 per cent on rates previously paid the employees affected. On basis of an annual payroll equal in numbers to that for 1915, these advances in rates will call for an increased disbursement of approximately \$14,000,000 per annum, while on basis of an employment equal to the average in 1913, the increased amount will be about \$18,000,000 annually.

As of Jan. 1, 1916, there was offered to employees of the United States Steel Corporation and of the subsidiary companies, the privilege of subscribing for shares of common stock of the corporation, at the price of \$85 per share. Subscriptions were received from 24,940 employees for an aggregate of 49,742 shares. The conditions attached to the offer and subscription, aside from the feature of price, were generally similar

to those under which stock has been heretofore offered to employees. The usual distribution of special compensation to employees under the plan adopted in 1903 was also made.

During the year the trustees of the United States Steel and Carnegie Pension Fund disbursed in pensions to retired employees the sum of \$659,389.42. In 1915 pensions were granted to 697 retiring employees. At Dec. 31, 1915, there were 3002 names on the pension rolls. The average age at which pensions to the foregoing were granted was 62.84 years, and the average term of service rendered by pensioners was 28.34 years.

During the past year, as in preceding years, careful thought and study have been given to conditions under which the employees work and live. The principal work during the year, however, was in extending efforts on lines which had already proved successful. Although additional expenditures are being made wherever necessary through installation of devices, facilities, etc., to safeguard employees from injuries, especial attention is now being directed toward enlisting the employees themselves in the prevention of accidents. At present 4249 employees are serving on safety committees whose efforts are being expended in this direction. The amount expended in 1915 by all companies for safety work was \$608,644. Serious and fatal accidents in 1915, based on the number of accidents per 100 employees in service, were 5 per cent less than in 1914 and 43.5 per cent less than in 1906. Fatal accidents in 1915 were 15.38 per cent less than in 1914 and 59.27 per cent less than in 1906.

The voluntary accident relief plan has been superseded to a large extent by workmen's compensation laws enacted by most of the States in which the subsidiary companies are operating. Such laws merely establish the principles upon which this plan of relief, regardless of legal liability, was inaugurated by the corporation before any such laws were in force. The subsidiary companies have promptly accepted the compensation acts and assisted the State commissions in administering them. The total amount paid out by all companies in 1915, in connection with work accidents, was \$1,998,751. Of this total 84.76 per cent was paid directly to injured employees or their families or in taking care of them.

The standards established for sanitation in and about the mills, mines, etc., are being extended. Comfort stations were constructed during the year at many of the plants and mines and there were provided 175 showers and 3103 lockers in addition to those previously installed. The total disbursements for sanitary work in 1915 were \$953,056, of which total \$215,512 were expended for protection of water supply and drinking water systems for use of the employees.

Efforts have been continued looking toward improvement of the material welfare of employees and their families, through discussing with them sanitary methods of living, through establishing means of recreation and wholesome amusement, through encouraging them in the free use of unused land surrounding the plants for gardening, and through the organization of educational classes for employees in which courses of instruction on special and practical lines are given. The efforts in these directions have met with practical indorsement and co-operation on the part of the employees.

Grateful appreciation is expressed for the loyal and efficient services during the year of the officers and employees of the corporation and the several subsidiary companies.

The Kohler Company, Kohler, Sheboygan County, Wis., manufacturing enameled plumbing ware, has promulgated an "America First" order, which says that promotions to positions of importance in the organization will henceforth be given only to those who are native born or naturalized citizens of the United States. Employees of foreign birth and citizenship will not be discriminated against in their present positions of work, but they will not be promoted to positions of responsibility or trust. This company recently instituted a bonus system to induce perfect attendance by workmen and other employees and pays 10 per cent of the monthly wage or salary for a 100 per cent attendance.

ESTABLISHED 1855

THE IRON AGE

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Dangers in the Steel Situation

The reference in THE IRON AGE market summary last week to "danger levels" appears to have disturbed some of the financial writers. The New York Times and the New York Evening Post, for instance, discuss the reference as if it were something requiring circumstantial proof in detail, the Post observing that "even the steel trade seems singularly unable to say clearly just what it means by 'danger-level,'" while the Times remarks that "if a danger level has actually been reached it seems plain that consumers have not yet come to a realization of that fact."

Not at all. The steel trade knows quite well what is dangerous. All advances are dangerous, to the extent that they may not be held; it is simply a question of degree. And far from consumers not realizing that there is danger, they know this quite well, but they are confronted by the other danger, of letting the market be and then not securing later the steel they may need.

That financial writers question our statement of last week is due to differences in viewpoint, to put it delicately. The atmosphere of Wall Street, where it is accepted doctrine that everything can be judged and estimated, causes financial writers, no doubt unconsciously, to judge the steel market according to stock market laws. The markets are totally different. Steel is sold for forward delivery, shares for immediate delivery. Technically the buyer of steel who is a jobber or manufacturing consumer and the speculator in shares are in the same class, in that both buy to sell again, but their positions are widely different. The jobber or manufacturing consumer in steel must provide for a regular trade, requiring about so much material week after week. The speculator in shares may close out his holdings in a day, nearby or far distant, or he may sell in parcels from time to time, precisely as his freshly formed judgment, day by day or hour by hour, may dictate. The typical buyer of steel must consider his market for a continuous period extending over many months.

A dangerous level in a stock market is one in which a break may occur in a few days. A dangerous level in the steel market may be one in which a break is threatened six months, even a year, in future. Another difference is that the holder of shares has a chance at least to liquidate, while the

buyer of steel is faced with the certainty of having to pocket his loss. That might be, literally, on millions of tons for the entire country, since buyers, in this time of record output of products into which steel enters, are forced to carry large stocks.

While the steel trade may be "singularly unable to say clearly" what a danger level is, it may be remarked that last June it became very probable that the steel market would break at the termination of the war, but that was no danger, for from the then viewpoint there would have been, without the war, nothing to break. Afterward it became evident that a large demand for steel, strictly domestic, was springing up, and thereupon the possibility of a break at the end of the war became a danger, since there was something to lose. That was months ago. The advances that have occurred more recently, not simply those of last week or the week before, have made it quite possible that the steel market will break before the end of the war. That is a fresh danger. Each price advance that increases the possibility of the market breaking before the end of the war, and tends to decrease the probability of the market continuing to gain in strength up to the close of the war, is a fresh danger. Each condition which induces the jobber or manufacturing consumer—the one who buys to pass material, eventually, on to another buyer—to purchase farther ahead, increases the prospect that when the break occurs this buyer will have too much material on hand or under contract, is a fresh danger. It is submitted that this statement is reasonably clear, even though in the circumstances it is impossible to be specific.

It is quite obvious that both buyers and sellers of steel have been making serious mistakes in the past few weeks. One finds that manufacturers of steel, with the same mill facilities, the same class of customers and precisely the same disposition to earn dividends, are pursuing widely different sales policies, so that some of them must be wrong. Among buyers one finds those who contract far ahead at high prices and others who refuse to contract far ahead at such prices. In this case the divergence in policy may be due less to temperamental differences and more to differences in the class of trade served. For instance, the automobile maker cannot risk the danger of not getting his raw material for his 1917 cars (and in the natural course of events some material lately contracted for will pass into so-called

1918 cars), while the maker of farm implements of the heavier class cannot risk the danger of loading up on high-priced material which he can dispose of at a profit only by sharply advancing the price of an implement which has been at an unchanged price for years.

When a situation arises in which many buyers and sellers, perhaps a fourth, perhaps a third, perhaps more, make serious mistakes, it is a dangerous situation. It is not the rule in the steel trade, by any means. Sellers and buyers, respectively, have hitherto acted quite closely together. It might be said that sometimes all sellers, or all buyers, are proved by events to have made a mistake, the same mistake, but that is not counted a mistake, the competitive position not being substantially altered.

On Dec. 31, 1906, the United States Steel Corporation had a tonnage of unfilled obligations on its books equal approximately to the shipments it actually made during the nine months following. The business was at substantially the prices then quoted in the market. Before ten months had fully passed the demand began to collapse. At the end of last month the corporation's unfilled obligations were equal to its shipments for not more than seven months, and the average price of the tonnage was much below the current market, while since that date the market has advanced several dollars a ton. The situation Dec. 31, 1906, might be denominated a reasonably safe one and yet the situation Feb. 29, 1916, might be called a very dangerous one.

There is no question that many manufacturing consumers must charge much more for their products if they are to pay current prices and there is no doubt that many possible buyers will not pay the advanced prices, finding it more desirable to wait. Superficially, the present demand seems to outrun the supply, so that there might be leeway for such curtailment without trouble being caused in the market; but it is not proved that actual ultimate consumption to-day is at a rate equal to the shipments of steel. Circumstances have moved jobbers and manufacturing consumers to secure shipment of all the steel they can get. Furthermore, much of the steel being shipped is reaching the ultimate consumer at much lower prices than now ruling. Any steel shipped to-day that was bought six months ago—no long time, with mills so congested as they have been lately—costs \$13 a ton less than to-day's market if wire, \$20 less if bars or shapes and \$25 less if plates. If bought three months ago, a very short time, the divergences are \$6, \$11 and \$16 respectively.

The current consumption of many products into which iron and steel enters is, therefore, no index to the consumption that will be seen when present prices must be paid; and that time apparently is not very many months distant. Conditions are such, therefore, that the steel trade cannot feel assured of as long a period of strong market conditions ahead as is usually the case when the market of the moment is a strong one.

Finally, no feeling of security is produced by the discovery that large mills which have hitherto had fixed prices from day to day, about which no secret was made, are now in many instances quite reserved in referring to the prices they are asking and in discussing the character and volume of orders they are currently entering on their books.

Steel Corporation New Construction

An interesting summary of the United States Steel Corporation's new construction work can be drawn from the annual report just published. Nearly all the new steel works construction, as then planned, was detailed in the general new construction compilation of THE IRON AGE, Jan. 6, but since then there have been some changes. Instead of the three open-hearth furnaces at the Donora works two 25-ton Bessemer converters will be installed, making Donora a well-rounded duplexing plant. In addition to the open-hearth furnaces already mentioned, two are being built at Clairton and one at Newburgh.

A part of the Minnesota steel plant was completed late in 1915, but as this was the first strictly new work for some time that plant may be included with those now being built, and the whole program of steel-making additions then stands as follows: Straight open-hearth furnaces, 10 at Duluth, Minn., four at Lorain, one at Newburgh, three at the Ohio works, Youngstown, and two at Clairton, making 20 straight open-hearth furnaces, with a capacity of probably about 1,000,000 tons annually. Of totally new duplexing plants there are two, at the South works and at Gary respectively, each comprising two 25-ton converters and two 100-ton tilting open-hearth furnaces. At Donora there are two 25-ton converters to work with 13 open-hearth furnaces completed long since. The duplexing additions may be estimated at 1,400,000 tons annual capacity additional, which, with the 1,000,000 tons already mentioned, gives a grand total of 2,400,000 tons.

The corporation's steel ingot production in 1914 was 11,826,476 tons, when operations were reported to be at about 62 per cent of capacity, indicating a capacity of 19,075,000 tons. Its production in 1915 was 16,376,492 tons, with operations estimated at about 85 per cent, indicating a capacity of 19,275,000 tons. Taking the capacity at the latter figure, the new construction program represents an increase of 20 per cent in steel making capacity, to a total of about 21,500,000 tons.

The new construction program with respect to blast furnaces is small, covering merely two furnaces at Duluth, making that plant self-contained, and four furnaces at Gary, possibly a trifle more than needed by the duplexing plant now being built. There is left, therefore, without attendant blast-furnace construction, the 10 straight open-hearth furnaces being built at various points, together with the duplexing plant for South Chicago and the duplexing addition at Donora, having a combined additional capacity of fully 1,300,000 tons of ingots. No half-and-half scrap and pig mixture can be considered with respect to this capacity, since it is largely duplex, and a large tonnage of pig iron will have to be found. The corporation seems already to be producing substantially as much pig iron as it can make. One evidence of this is that it is shipping pig iron from Pittsburgh to Chicago. When the Donora converters are completed, the date mentioned being June 1 next, the Pittsburgh district will require considerably more pig iron than formerly, while the completion of the duplexing plant at the South works, set for about Oct. 1, will increase the Chicago district requirements.

The new by-product coking plants being built are: Clairton, 200 ovens; Youngstown, 210 ovens; Central furnaces, Cleveland, 180 ovens; Lorain, 225 ovens, making a total of 815 ovens. At the close of 1915 there were the following completed by-product plants: Farrell, 212; Benwood, W. Va., 120; Joliet, 280; Gary, 560; Duluth, 90; Fairfield, Ala., 280, making 1542 retort ovens. There were 22,153 beehive ovens in the North and 2974 in the South, making a total of 25,127 beehive ovens. While operations were not at capacity throughout 1915, it may be interesting to note that the 9,701,692 net tons of beehive coke produced represented 386 tons per oven per annum, while the 4,799,126 tons of by-product coke produced represented an average of 3180 tons per retort per annum. Probably it would be safe to estimate these ovens, as well as those being built, at 3500 tons a year each, which would indicate that the corporation will eventually have capacity to make 8,250,000 tons of by-product coke a year. As it could doubtless produce more than 10,000,000 tons annually in its beehive ovens, it will have a surplus of the latter.

Electric Tool and Other Steels

When the present wave of new steel works construction subsides, it will be found that another product will be thought of in terms of tonnage. This is the so-called quality steel, such as that used for metal-cutting tools and that marketed as special alloy steel. These steels were being made in increasing quantities prior to the war, but the fame of certain foreign products strongly influenced American buyers. It required the checks to ocean shipments to familiarize users here with the American products and to convince them that home steels meet the demands they had thought only fully satisfied by the foreign article.

In this development the electric furnace is taking a large part. What the future will bring out, when present bolstered prices lose their props, cannot be forecasted with a certainty, but we now have a process which involves heats of thousands of pounds from a single unit with a nicety of control of the constituents. Against the tonnage production may be spread the operating and overhead charges, but plants now in operation should have the chance of writing off a portion of the latter to prepare for the severe competition of the future. With the extensive rolling equipment which a few steel-making elements will serve, and the susceptibility of the electric furnace to quick changes to various alloy products, the contest for business between electric and crucible steels will be interesting, save where there may be sentiment or something stronger for the product of the older process.

The Steel Corporation Suit

The United States Supreme Court on March 21 made an order in the case of the suit of the Government against the United States Steel Corporation, requiring the entire record to be certified up to the court and fixing May 20 as the limit for such certification. Inasmuch as the court at that date will be on the eve of adjournment, the order is regarded as precluding the possibility that the appeal in this case will be argued at the present term. The next term will be held in October.

Lake Superior Iron Ore in 1915

Shipments of Lake Superior iron ore by mines in 1915, according to the *Iron Trade Review*, were 47,272,751 tons, as against 32,729,726 tons in 1914, an increase of 14,543,025 tons, or 44.43 per cent. The all-rail shipments were 953,947 tons, against 707,829 tons in 1914. The season's total lake shipments were given in THE IRON AGE of Dec. 9, 1915. Shipments by ranges for four years were as follows in gross tons:

| | 1915 | 1914 | 1913 | 1912 |
|--------------------|------------|------------|------------|------------|
| Marquette | 4,105,378 | 2,491,857 | 3,966,680 | 4,202,308 |
| Menominee | 4,982,626 | 3,221,258 | 4,965,604 | 4,711,410 |
| Gogebic | 5,477,767 | 3,568,482 | 4,531,558 | 5,006,266 |
| Vermillion | 1,733,595 | 1,016,993 | 1,566,600 | 1,844,981 |
| Mesaba | 29,756,689 | 21,465,967 | 34,038,643 | 32,047,409 |
| Cuyuna | 1,136,113 | 859,404 | 733,021 | 305,111 |
| Miscellaneous | 80,583 | 105,765 | 145,010 | 104,031 |
| Total | 47,272,751 | 32,729,726 | 49,947,116 | 48,221,546 |

Last year's shipments have been exceeded in two previous years—48,221,546 tons in 1912 and 49,947,116 tons in 1913. The all-rail movement last year of 953,947 tons has been exceeded but twice in the last 10 years—975,959 tons in 1907 and 1,052,173 tons in 1906. An unusual feature of the year's movement was that the independent companies forwarded 52.37 per cent of the total shipments, the largest since the Steel Corporation was formed, and it is the fourth successive year in which these companies have shipped more than half the total. The Steel Corporation's shipments were 22,518,613 tons, or 47.63 per cent. The 1915 percentage of the corporation is the lowest recorded, the largest having been 56 per cent in 1907 and 1908.

The Mesaba range percentage of the total was 62.95 last year, representing 29,756,689 tons, against 21,465,967 tons in 1914, or 65.62 per cent. The Cuyuna range forwarded more than 1,000,000 tons for the first time. Seven mines shipped more than 1,000,000 tons each last year. There were 22 new shipping mines last year, against 16 in 1914.

The Wharton Steel Company Purchase

The interests represented by N. L. C. Kachelmacher, which some time ago exercised an option on the blast furnaces and mines of the Wharton Steel Company at Wharton, N. J., at \$1,500,000, have been negotiating in various directions with a view to disposing of the properties. The option was exercised on Jan. 15 and the promoters had until March 15 to take title. It is understood that an extension of time has been made until April 1. In the past week the recording of the option at Morristown, N. J., indicated that it had been acquired by the Eastern Finance Corporation of New York. Nothing definite has developed as to the operation of the Wharton furnaces and iron mines, as apparently the property is not yet in the hands of an operating company.

New Buildings at Salem Wire Plant

The American Steel & Wire Company will erect two steel buildings at its Salem, Ohio, works, long known as the Baackes plant, to replace the old structures destroyed in a fire that seriously damaged the plant March 16. The new buildings will be 65 x 330 ft. and 48 x 200 ft.

The corporation of Whitney, Felker & Murdock, Philadelphia, has been formed by Charles H. Whitney and H. C. Murdock, formerly of the W. A. Mitchell Company, Philadelphia, and George F. Felker, at present New York representative of the Pittsburgh Valve, Foundry & Construction Company, to undertake high pressure piping installations. They have acquired a plant at Memphis and Tioga streets, Philadelphia, and are prepared to undertake all classes of piping work, including bending, welding and Van Stone work.

The C. Pardee Works, Perth Amboy, N. J., is erecting another 50-ton basic open-hearth furnace and auxiliary equipment required by such a plant, including additions to its steam and electric power plants, mono-rail and other facilities. It is also building a new plant for the manufacture of safety nuts for the Standard Safety Nut Corporation, 30 Church Street, New York.

CORRESPONDENCE

The Employment Departments of the National Engineering Societies

To the Editor: We note the letter on page 673 of THE IRON AGE of March 16, 1916, on "Answering Help Wanted Advertisements." It seems to us that the national societies are the logical means of bringing employer and employee together for many reasons:

1. The headquarters of the national societies have the records of members desiring positions during practically their whole career, and in addition frequently have personal knowledge of the candidate, or at least some knowledge of his reputation among his associates.

2. The employment departments of the societies are run solely for the benefit of the members and no expense is spared in the matter of telegrams or other means of bringing employer and employee together quickly, which is often a very important consideration.

3. The employment departments of the societies are in receipt of confidential information from both sides. The confidence is never violated and there is no danger that an employer will receive an intimation that his employee is looking for another position, or vice versa.

4. The references of an employee can be verified very thoroughly by the employment department of a society without putting the employee under the slightest embarrassment or danger of strained relations with his present employer.

5. The employment department of a national society by long experience is often better able to choose a position for an employee or to choose an employee for a position than either party to the contract.

At least two of the national engineering societies give earnest, painstaking and prompt attention to the problem of bringing employer and employee together. No charge whatever is made to either side for the service. Sometimes this service involves printing a list of positions vacant and engineers available in the societies' publications, but many employers and many employees prefer to avoid this publication, in which case the negotiations are done directly by letter or wire. The degree to which this service is appreciated is shown by the greatly increased activity of the employment department of the society with which the undersigned is connected during the few years it has been in operation.

BRADLEY STOUGHTON,

Secretary American Institute of Mining Engineers.

New York, March 18, 1916.

[Some of the engineering societies have done good work in the way Mr. Stoughton points out; but its limitations are well known, as indicated by the forwarding through this office last year of 11,201 letters to advertisers in THE IRON AGE's classified sections. Letters relating to employment were the largest factor in this total.—EDITOR.]

High Sulphur Fuels and Steel

To the Editor: An article by J. R. Campbell, in THE IRON AGE of Feb. 10, 1916, on "Sulphur Elimination in Coking Processes" I consider one of the best and most progressive I have read in a mechanical paper in years. I have heard for a long time a great deal about the injurious results of sulphur on metal. While engineers and metallurgists are conscious of the fact that too much sulphur in any fuel is injurious yet for years manufacturers, living in a section of the United States where there is plenty of natural gas, etc., have striven to magnify the injurious effects on metal of sulphur contained in liquid fuel, until people desiring to procure metal were afraid to purchase from any manufacturer who did not use natural gas as a fuel.

During the last few years I have heard considerable about the injurious effects on metal when burning oil having as high as from 3 to 3.50 per cent sulphur, and have had many battles on this question of sulphur in

striving to introduce oil as fuel, but now I am able to state that I have a large number of installations in which oil containing that percentage of sulphur is being used without any detrimental effect on the metal, either in melting or heat-treating it.

Many people condemn liquid fuel when they should condemn their own methods of attempting to get results from it. There is but one way to burn liquid fuel in order to eliminate the difficulty of sulphur, and that is, first, thoroughly atomize the oil, and second, provide a combustion chamber of adequate proportions in order that the fuel may be consumed in this combustion chamber and be reduced to heat before it reaches the furnace proper.

Also, in THE IRON AGE of Jan. 13, 1916, you published an article by Dr. J. S. Unger, on "High and Low Sulphur in Basic Steel," which is certainly worthy of the highest consideration. The effect of sulphur in metal, as there shown, bears out the statements I have made.

W. N. BEST.

New York, March 16, 1916.

The Threatened Railroad Strike

To the Editor: The resolutions of the Chicago Association of Commerce, as set forth in the March 16 issue of THE IRON AGE, are based upon a false premise. The impression then given is that the railroad owners are just as anxious to tie up traffic in order to defeat the demands of the employees as the latter are to enforce such demands. A perusal of the news columns indicates that the leaders of the employees are the ones who have threatened to stop all wheels if their demands are not met. In fact, this is a favorite threat whenever the railroad employees present demands; but no doubt it is uttered each time only to make sure that the differences reach at least the point of arbitration. By arbitration a large proportion of their demands are gained and there is always open to them later on the threat to strike for the rest, with a few more added for good measure. How amazed the public would be at the spectacle of the railroad owners announcing, upon the eve of a request to the Interstate Commerce Commission for increases in rates, a general shut down in case of refusal. Has any railroad or combination of roads ever even hinted at such a supreme disregard for the public? Yet where does this differ in principle from the present attitude of the unions involved?

THE IRON AGE says: "One thing at least is possible—the utter condemnation of such a strike before the court of public opinion." And which side will this honorable court condemn? The employee? No; the employer always. Now the false premise of the Chicago Association of Commerce is that in the long run either the owners or the public will profit by arbitration. The owners lose because the employees always get more than the roads can well afford to concede, and the public loses because the roads simply must either pass along the added burden of expense or else curtail on equipment and service.

The third "whereas" of these resolutions should be amended so as to read, "... entailing a loss upon the public far greater than the loss to the other party to the controversy," etc. It is hard to see where the employee loses anything, because arbitration as we have it to-day gives it back to him usually in added measure.

H. M.

Welding of High-Speed Steel

To the Editor: On page 700 of THE IRON AGE of March 16, I notice a short article on the welding of high-speed steel to ordinary tool steel. This item indicated that it was necessary to use the electrical process. In THE IRON AGE of Oct. 27, 1910, I read an article by W. F. Stanton, master blacksmith, J. A. Fay & Egan Company, Cincinnati, Ohio, describing in detail a method of successfully welding high-speed steel to ordinary machinery steel. The secret of the proposition was welding by compression instead of concussion. As is well known, high-speed steel when heated to a welding temperature will shatter if it is struck a sudden blow.

The article referred to describes minutely how im-

ple and easy it is to weld the two steels, and I have found that an old-time letter copying press serves the purpose admirably. A welding compound of borax will answer the purpose as well as some of the regular marketed articles of this kind.

Just at the present time when high-speed steel is selling at a very high price, I should think that a great saving could be effected by many manufacturers who are large users of cutting tools.

C. L. S.

GOVERNMENT ARMOR PLANT

Senate Passes the Bill Appropriating \$11,000,000 for Purchase or Construction

WASHINGTON, D. C., March 21, 1916.—The Senate late to-night by a vote of 58 to 23 passed the Tillman bill appropriating \$11,000,000 to purchase or construct a Government armor plate factory with a capacity of 20,000 tons per annum. The bill now goes to the House Committee on Naval Affairs, by which it probably will be favorably reported after the annual naval appropriation bill has been disposed of. The measure will encounter stubborn opposition in the House, but its ultimate passage is regarded as assured.

To a fair and unprejudiced observer the weight of argument in the Senate debate has been entirely with the opponents of the measure. Chairman Tillman and Senators Ashurst, of Arizona, and Swanson, of Virginia, have urged the passage of the bill, but their speeches have been merely a repetition of the cheap clap-trap which characterized Senator Tillman's report upon the bill, including unsupported declarations as to the cost of producing armor plate, the fabulous profits said to have been derived by the manufacturers and the enormous saving certain to accrue to the Government from the production of armor plate in its own works.

The opposition to the bill has afforded a striking contrast. Exhaustive, well-considered arguments, based upon careful examination of the evidence and more or less independent research, have been presented by some of the ablest members of the Senate, including Senators Lodge and Weeks, of Massachusetts; Lippitt, of Rhode Island; Penrose, of Pennsylvania; Curtis, of Kansas, and others, and there can be no doubt that if the bill had been considered on its merits instead of as an Administration measure personally championed by the chairman of the Naval Committee, who holds his post by the rule of seniority rather than because of any expert knowledge he possesses concerning naval matters, the bill would be foredoomed to failure in both houses.

EXPERTS FAVOR PRIVATE MANUFACTURE

The principle underlying the bill is strongly opposed by a board of expert ordnance officers of the army, recently appointed to investigate the subject of the Government manufacture of munitions, which strongly urges that as many private plants as possible of those now engaged in making war material for Europe be kept going after the close of the war by the allotment of orders from the United States Government. This source of supply, the board says, would be much more economical than Government plants, which would cost enormous sums if built on an adequate scale for war needs. Quite as significant is the carefully prepared statement by Hudson Maxim, a member of the Advisory Board of the Navy Department, which urges that every possible effort be made to maintain the efficiency of private plants manufacturing war material. Mr. Maxim points out that in their present development these plants have been almost entirely financed with foreign capital, some of them having been developed fifty to one hundred fold. The capacity of these plants at this time is estimated at five hundred times as great as it was when the war broke out, and, as nearly all of these establishments have been subjected to more or less amortization, their owners are in position to supply material for both army and navy at much less than the cost of manufacture in Government establishments.

In opposing the Tillman bill Senator Weeks cited many instances of failure by the Government to manufacture products equaling in quality or low cost similar articles previously purchased from private concerns. "Some years ago," he said, "the simplest form of steel-making was attempted at the Brooklyn Navy Yard, and I am informed that the failure was so acute that no one would seriously consider repeating such attempt. The Government believed it could save money by buying pig iron and casting its own steel for small work. It did not contemplate in any degree the casting of steel for such important work as is contemplated in this armor plate project. The steel made at this plant was defective in many respects and the expense of producing it was so great that some two years ago the whole project was abandoned and the plant has not been used since, the Department turning back to the commercial market to buy its castings."

REFUSE TO RECORD GOVERNMENT COSTS

In reaching a conclusion to authorize a Government armor plant the Senate made a remarkable record. By a vote of 47 to 33 it refused to direct the Secretary of the Navy to call in expert chartered private accountants to open a set of books and keep a record of the expenses of plans, site, construction and other costs leading up to the establishment of a Government plant and finally to report on the cost per ton of armor at a Government plant.

Senator Newlands and Senator Cummins, Senator Borah and Senator Works, all of whom voted for the Government plant, urged the expert accountant amendment. Senator Newlands reminded his Democratic colleagues that they had been urging against the armor manufacturers the fact that they would not disclose their actual cost items. Now to refuse to give the public the benefit of this information as it related to a Government plant was not consistent.

Senator Oliver, of Pennsylvania, who opposed the bill, stated that he was authorized by the Midvale Steel Company to announce that that company would not raise its price for armor should the bill pass. Under ordinary conditions the company felt it would be "justified in adding to the price such sum as would partially compensate it for rendering its plant useless by this legislation, but, considering the position in which the country stood to-day, it had been decided that it would not be a patriotic move; hence this legislation would make no difference in the price at which it would furnish armor plate to the Government."

Senator Hitchcock, of Nebraska, in favoring the bill, described the experience of the Government in manufacturing its own smokeless powder, but his attention was sharply drawn by several Senators to the fact that the manufacture of powder was a thoroughly standardized industry complete within itself, whereas the successful manufacture of armor plate was exceedingly difficult and to secure economical results must be prosecuted in connection with a great steel works.

W. L. C.

New Iron and Steel Plants in Canada

Canadian press reports contain the following concerning new and projected construction in iron and steel lines:

The construction work of the Port Moody Steel Works plant at Port Moody, B. C., is progressing rapidly and is expected to be completed within a few months. The rolling mill will turn out smaller shapes.

The Manitoba Steel Foundries, Ltd., Winnipeg, Man., recently incorporated, will install an electric furnace. Peter J. Smith, 1006 Electric Railway Chambers, is manager.

The Stanley Steel Company, Ltd., Hamilton, Ont., has been incorporated with a capital stock of \$250,000 by Arthur F. Hatch, Thomas C. Haslett, William F. McGiverin, and others, to manufacture iron, steel, sheet metal, steel rails, wire, machinery, tools, etc.

The Hamilton By-Products Coke Oven Company, Hamilton, Ont., has finished plans for an extensive coke oven plant which it will build on the water front.

Asbestos Protected Metal Company Expands

The Asbestos Protected Metal Company, First National Bank Building, Pittsburgh, now operating plants at Beaver Falls, Pa., and Waltham, Mass., has bought over six acres at Economy, Pa., about 15 miles below Pittsburgh on the Pennsylvania Lines West, on part of which it will build a new plant, largely of steel construction. There will be four manufacturing and storage buildings, one office building, a power plant building, and several smaller buildings. These will take about three acres, leaving the remainder for future extensions. The building for manufacturing will be 60 x 180 ft.; another, of the same size, will contain the metal-working machinery; the third, 50 x 140 ft., will be used entirely for storage of raw materials and will be equipped with a number of small electric cranes, running up to 5 tons capacity; a fourth will be 80 x 140 ft., to be used for shipping and storage of finished products.

A feature of the new plant will be that all of the designing and erection of the buildings will be done by the company's own engineering and contracting organization. Some novel ideas will be embodied in their construction. Asbestosteel lath will be used for the walls and asbestosteel gypsum slab for the roofs. The Waugh skylight and monitor sash, made by the company, will be exclusively used. The power house, 30 x 40 ft., sheathed with asbestos protected metal, will contain boilers, pumps and other power equipment. It is likely that electric power will be used throughout, each machine to have its individual motor, but this has not yet been fully decided upon. The buildings will be heated with warm air, and special attention will be paid to ventilation. There will also be a chemical and research laboratory building.

In putting up the new plant the company will pay special attention to the welfare and convenience of its employees. It is the intention to utilize the unoccupied ground by laying out tennis courts and a baseball range, and there will be other outdoor amusements for employees. Each building will have its own toilet facilities, steel lockers, wash stands and shower baths. The office building will be 40 x 50 ft., two stories, and will contain a large dining room. Work on leveling the ground has started, and the company hopes to have the entire plant completed by September next. It will then treble the present capacity.

Carnegie Additions at Various Points

The Carnegie Steel Company, Pittsburgh, has decided to add to the works at Farrell, Pa., three 65-ton open-hearth furnaces and a four-hole soaking pit furnace. The plant will then have 15 open-hearth furnaces, each with a capacity of 60 to 65 tons per heat. For some time the output of pig iron and the rolling-mill capacity at the Farrell works have been slightly ahead of the steel capacity.

The Carnegie Company has also decided to add a by-product coke-oven plant at its Ohio works at Youngstown, Ohio, but the exact number and type of ovens have not been decided. It will have an annual capacity of 1,000,000 tons of coke, which will be enough to supply the company's adjacent six 500-ton furnaces. It will also build sufficient by-product coke ovens at its works at New Castle, Pa., to make 750,000 tons of coke per year to serve the four blast furnaces there. The company has also decided to increase the number of by-product coke ovens being built at Clairton, Pa. The original number was 210, but sufficient ovens will be added to make 3,000,000 tons of coke per year. Part will be used in the three Clairton blast furnaces, some at the six Duquesne furnaces, and, if any remains, it will likely be used at the Edgar Thomson furnaces. It is also the intention to erect tar and ammonia recovery plants at the new by-product coke ovens at Clairton, Youngstown and New Castle.

Steel merchant vessels, building or under contract March 1, 1916, at American shipyards, were 244 against 224 Feb. 1. The gross tonnage is about 945,798.

CONTENTS

| | |
|---|-----|
| Continuous Melting in a Small Foundry..... | 709 |
| Aluminum from Clay..... | 712 |
| Heat Treatment of Chains..... | 713 |
| American Electrolytic Zinc..... | 713 |
| "Safety First" in Coal Mine and Coke Plant..... | 714 |
| Merchant & Evans Company..... | 717 |
| Organizing for Industrial Preparedness..... | 718 |
| Bethlehem Steel Report..... | 719 |
| The Determination of Gases in Steel..... | 720 |
| International Harvester Profit Sharing..... | 721 |
| Boring Bar for Engine Cylinders..... | 721 |
| Nick and Break Test in Rail Inspection..... | 722 |
| Pennsylvania Industrial Accidents in 1915..... | 726 |
| United States Steel Corporation's 1915 Report..... | 727 |
| Dangers in the Steel Situation..... | 730 |
| Steel Corporation New Construction..... | 731 |
| Electric Tool and Other Steels..... | 732 |
| The Steel Corporation Suit | 732 |
| Lake Superior Iron Ore in 1915..... | 732 |
| The Wharton Steel Company Purchase..... | 732 |
| New Buildings at Salem Wire Plant..... | 732 |
| Correspondence | 733 |
| Government Armor Plant..... | 734 |
| New Iron and Steel Plants in Canada..... | 734 |
| Asbestos Protected Metal Company Expands..... | 735 |
| Carnegie Additions at Various Points..... | 735 |
| La Belle Iron Works Report..... | 736 |
| To Make Ferromanganese at Sheridan, Pa..... | 736 |
| Book Reviews | 737 |
| Cambria Steel Company's Year..... | 738 |
| Lectures in Pittsburgh on Military Engineering..... | 738 |
| Farnsworth Steam Utilities | 738 |
| J. I. Case Shows Large Gain..... | 739 |
| Iron and Steel Institute Memberships..... | 739 |
| Iron-Ore Imports and Exports in 1915..... | 739 |
| Large Outlays for Ellwood City and Duquesne Improve- ments | 739 |
| New Open-Hearth Furnaces at Johnstown, Pa..... | 739 |
| Engineers' Meeting at Cincinnati..... | 739 |
| Iron and Steel Markets | 740 |
| Iron and Industrial Stocks..... | 751 |
| Buffalo Machinists' Strike Over..... | 751 |
| Finished Iron and Steel Prices, Pittsburgh..... | 752 |
| Metal Markets | 753 |
| Personal | 754 |
| R. H. Sweetser Resigns from Thomas Iron Co..... | 754 |
| Obituary | 755 |
| Papers for Mechanical Engineers' Meeting..... | 756 |
| The Trend in Large Power Plants..... | 756 |
| An Engineering Conference in Chicago..... | 756 |
| Cincinnati Planer Christmas Fund..... | 756 |
| Pittsburgh and Nearby Districts..... | 757 |
| New York City Wants a Purchasing Agent..... | 757 |
| Machinery Markets and News of the Works..... | 758 |
| New Trade Publications..... | 766 |

La Belle Iron Works Report

The annual report of the La Belle Iron Works, Steubenville, Ohio, for the year ended Dec. 31, 1915, reflects the great improvement in conditions in the steel trade over 1914. The surplus after interest and dividends was \$531,258.38 for the year, against a deficit in the previous year of \$470,410.39. The following is a comparative statement of the income account:

| | 1915 | 1914 |
|---|----------------|----------------|
| Net earnings from operations... | \$1,281,492.52 | \$588,811.86 |
| Less provision for the exhaustion of minerals and extinguishment of lease values..... | 253,758.14 | 209,898.92 |
| Profits for the period..... | \$1,027,734.38 | \$378,912.94 |
| Deduct: | | |
| Interest on bonds..... | 99,860.00 | 105,668.33 |
| Cash dividends..... | 396,616.00 | 743,655.00 |
| Balance..... | \$531,258.38 | *\$470,410.39 |
| Surplus at beginning of period... | 2,775,059.94 | 3,245,470.33 |
| | \$3,306,318.32 | \$2,775,059.94 |
| Deduct appropriation for depreciation..... | 250,000.00 | |
| Net surplus, carried to balance sheet..... | \$3,056,318.32 | \$2,775,059.94 |

*Deficit.

The balance sheet as of Dec. 31, 1915, is as follows:

| Assets | |
|--|-----------------|
| Real estate, buildings, equipment, etc., including payments on construction contracts in progress, also mining and gas and oil properties..... | \$22,576,420.34 |
| Investments at cost..... | 198,411.87 |
| Cash held by trustee for redemption of matured bonds..... | 6,500.00 |
| Inventories of manufactured products, materials and supplies at cost..... | 3,338,751.77 |
| Accounts and bills receivable..... | 1,562,974.71 |
| Cash..... | 483,764.00 |
| Deferred charges to future operations..... | 52,349.58 |
| Total..... | \$28,219,172.27 |
| Liabilities | |
| Common stock..... | \$9,915,400.00 |
| *Preferred stock..... | 9,915,400.00 |
| First mortgage bonds..... | 21,417,300.00 |
| Accounts payable..... | 562,881.29 |
| Wages, taxes and royalties accrued..... | 303,476.41 |
| Bond interest accrued and coupons not presented for payment..... | 11,830.00 |
| Dividends unpaid..... | 168.60 |
| Reserves: | |
| For general depreciation..... | 1,589,589.21 |
| For exhaustion of minerals..... | 1,140,213.49 |
| For relining furnaces, extraordinary repairs and contingencies..... | 137,395.55 |
| Surplus at Dec. 31, 1915..... | 3,056,318.32 |
| Total..... | \$28,219,172.27 |

*Cumulative dividends at Dec. 31, 1915, amounted to 5 per cent.

In his report to the stockholders, R. C. Kirk, president, said in part: The demand for the company's products at the opening of the year was at a very low ebb; consequently operations the first quarter were on a basis of approximately 40 per cent of capacity. Production was gradually increased and the second quarter the plants were operated on a basis of approximately 70 per cent of capacity. During the last half of the year the plants were operated at capacity, our open-hearth steel production for this period having exceeded the production of any similar period in the history of the company. The tonnage produced and comparison with the previous year are as follows:

| Gross Tons | 1915 | 1914 |
|------------------------|---------|---------|
| Pig iron..... | 169,836 | 170,020 |
| Billets and slabs..... | 284,089 | 244,560 |
| Finished goods..... | 376,434 | 338,488 |

The average number of employees during the year was approximately 3551, the payroll for this period aggregating \$3,067,074.37, or an average of \$863.72 for each employee.

A contract was let in September for the erection of a by-product coke-oven plant consisting of 94 12½-ton Koppers regenerative by-product ovens, having a daily capacity of 1000 tons of coke, designed for the recovery of gas, tar, sulphate of ammonia and light oil. In November a contract was let for the erection of a benzol plant designed for the recovery of benzol, toluol and solvent naphtha, to be operated in connection with the by-product coke plant. Ground was broken Sept. 22 and construction is progressing satisfactorily.

It is expected that the coke plant and the benzol plant will be in operation in the third quarter of 1916.

With the view of connecting the properties of the company at Steubenville, Ohio, with its Brooke County properties on the opposite side of the Ohio River, a charter for the Ohio-West Virginia Bridge Company was obtained in November. No other action, however, was taken in connection with the bridge in the year under review.

The oil production for the year was 3752 bbl., the output at the present time being about 300 bbl. per month.

Adequate provision was made for all ore and coal land depletions and ample reserves provided for relining, rebuilding and contingent fund purposes. In addition to this the sum of \$665,300 was expended during the year for maintenance and repairs, this being charged against the year's profits, in comparison with \$636,200 for the previous year. The reserve for general depreciation has received a further appropriation of \$250,000, bringing the total reserve for this purpose to \$1,589,589.21.

The year 1915 was one of unusual problems. Opening with the unsatisfactory business conditions which existed in the previous year, recovery was slow until near the close of the first half, after which time progress was rapid and for the past several months demand has exceeded supply and values have reached figures unattained since the year 1907. Illustrative of the improvement in market conditions, it may be of interest to state that of the total profits for the year 84 per cent was earned in the last half.

To Make Ferromanganese at Sheridan, Pa.

E. J. Lavino & Co., Bullitt Building, Philadelphia, who have imported large quantities of Brazilian manganese ore, considerable of which has been manufactured into ferromanganese under conversion arrangements, have purchased the Sheridan furnace of the Berkshire Iron Works, Sheridan, Pa., and after repairs are made it will be started on standard 80 per cent ferromanganese, using Brazilian ore. The Sheridan furnace has not been active for the past two or three years. Its product was handled by Naylor & Co., New York.

The stack to be placed in operation was built in 1874-1875, and rebuilt in 1891. It is 16 x 75 ft. There are three firebrick stoves, two Ford & Moncur, each 20 x 60 ft., and one Roberts, 20 x 80 ft. Repairs already are under way, but the date of blowing in has not been definitely fixed. The sale of the furnace was negotiated through Park & Williams, Real Estate Trust Building, Philadelphia, who are Philadelphia agents of Naylor & Co. The chief interest in the property was held by members of the firm of Naylor, Benzon & Co., London, Eng. The Berkshire Iron Works holds a 1-96 interest in the iron ore property of the Cornwall Ore Bank Company, Cornwall, Pa.

The Engineers' Society of Pennsylvania will hold its second annual banquet March 25 at the Harrisburg Club, Harrisburg, when the twelfth anniversary of the founding of the society will also be celebrated. Among the speakers expected are J. V. W. Reynders, former vice-president and general manager of the Pennsylvania Steel Company, and Quincy Bent, general manager of the Steelton and Lebanon plants of the Pennsylvania Steel Company. The keynote of the addresses will be "preparedness" from the industrial and engineering viewpoint.

The Bordentown Forge & Machine Company, Bordentown, N. J., is filling orders for marine forgings for the various shipyards building merchant vessels. The inference that might be drawn from a paragraph in our article of March 16 on "Steel Castings for American Battleships and Merchantmen," that this company is not now engaged in such work was not intended. It has been for many years a prominent factor in this class of forgings.

Book Reviews

Metal Statistics, 1916. Pages 368; 4 x 6½ in.; cloth. Published by the American Metal Market and Daily Iron and Steel Report, New York. Price 50c.

This is the ninth annual edition of these statistics, and the editors as heretofore are C. S. J. Trench and B. E. V. Luty. The volume is somewhat larger than those preceding. The old tables have been carried forward and there are some new ones. "Metal Statistics" has gained a firm place in the trade as a convenient and comprehensive handbook giving in small space a great variety of data of production and prices of iron and steel and the leading non-ferrous metals. The price statistics of recent years are those of the American Metal Market; those for earlier years are evidently based on THE IRON AGE's quotations, in some cases through tabulations of the American Iron and Steel Association. The composite pig-iron price given for Jan. 1, 1916, is \$18.585, as compared with \$14.15 in 1915 and \$13.52 in 1914. The index steel price for Dec. 31, 1915, is 1.87c., compared with 1.35c. as low in December, 1914, and 1.65c. as high in the movement of 1912-13. This index price is derived by using nine products and weighting the price of each by the tonnage output of 1906. A considerable change has taken place in the tonnage percentages since that year.

Business Psychology. By Hugo Münsterberg. Pages, 296 + xi, 5¾ x 8¾ in., illustrated. Published by the La Salle Extension University, 2550 Michigan Avenue, Chicago, as one of a series of text-books used in the university's business administration course.

Professor Münsterberg is peculiarly able to treat this subject because of his first-hand knowledge of both business and psychology. As stated in the preface, he aims here "to bring together those results of modern psychological thinking which are significant for the work of the business man." This he does most effectively. He does not attempt to trace the origin and history of various psychological theories, but states what are, in most cases, the accepted principles of psychology and applies these to modern business problems and practice. Most of the application lies in the field of salesmanship.

The book, as its writer says, demands thorough study, but the style is so simple and charming that the study becomes a pleasure. The book is admirably arranged in short chapters, and the material grouped under topical headings. Test questions at the close of each chapter summarize the material as well as suggest broader fields of interest. The book should serve not only as a help to the business man interested in studying psychology, but also to the psychologists desiring to come in touch with business problems. Moreover, the reviewer believes that any one who has time and opportunity to read but one psychology would make no mistake in choosing this volume as that book. L. M. G.

Modern Starting, Lighting and Ignition Systems. By Victor W. Pagé. Pages, 509, 5½ x 8 in.; illustrations, 298. Published by the Norman W. Henley Publishing Company, 132 Nassau Street, New York City. Price, \$1.50.

This book, which has been written with special reference to the requirements of the non-technical reader who desires easily understood explanatory matter relating to all types of automobile ignition, starting and lighting systems, is a complete exposition of all forms of electrical ignition systems used with internal combustion engines of all types and includes a comprehensive series of instructions pertaining to the starting and lighting systems of automobiles. Storage battery construction and maintenance, magneto timing, the care of motors and generators and a systematic location of all electrical faults are also described. All of the representative systems are described in detail, the text matter being supplemented by diagrams showing the connections and the relation that the various parts of the system bear to each other. Full directions are given for making repairs and descriptions of various accessories operated by electric current, such as gear shifting, brake ac-

tuating and signaling devices; vulcanizers, etc., are presented.

After a description of the elementary principles of electricity, the battery and magneto systems of ignition are explained at some length and the same arrangement is followed for the principles of the starting system. The practical application of typical starting and lighting systems is gone into at some length in chapter V, the text being supplemented by numerous wiring diagrams of the systems in use at the present time. Instructions for locating and repairing troubles in the starting and lighting systems are given in the next chapter, and the final one is devoted to auxiliary electric systems, such as gear shifting devices, warning signals, brakes, magnetic transmission, etc.

The Diesel Engine in Practice. By J. E. Megson and H. S. Jones. Pages, 136, 4¼ x 6¾ in.; illustrations, 37. Published by the Technical Publishing Company, Crossley Building, San Francisco, Cal. Price \$2.

The object of this book is to give engineers and those who are interested in the Diesel engine the information needed to enable them to care for and operate a prime mover of this type. At the present time there are over twenty manufacturers building different types of engines and between 400 and 500 plants in the United States are now being operated with these engines, the number ranging from 1 to 18 per plant.

After a brief historical outline of the development of the engine, the basis of its operation is described, followed by an account of some of the earlier installations. The subjects of fuel oil and the effect of altitude upon the power output are discussed in chapters IV and V. The next chapter contains instructions on the operation and care of the engine and data on the operation of some of the installations are presented in chapter VII. The various types of Diesel and semi-Diesel engines are briefly described in the next two chapters, the text being supplemented by drawings of the different ones. The commercial possibilities of the engine for land and marine service are discussed in the last two chapters.

The Mechanical World Electrical Pocket Book for 1916. Pages, 299; 4 x 6 in. Published by Emmott & Co., Ltd., 65 King Street, Manchester, England. Price, 25c.

In the revision of this yearly electrical pocket book the principal new features are the section on switchboards and switching gear, which contains considerable information in concise form and includes a number of new illustrations; a new section on grounding and a full revision of the section on lighting circuits and switching, which also includes some additional illustrations. The section on accumulators has been extended to include particulars of the alkali and Edison cells, and considerable new matter has been introduced on the efficiency of direct-current dynamos and motors, etc. The sections on electric lamps and lighting have been brought up to date, in addition to a full revision of the book in general.

Louis Hanssen's Sons, Davenport, Iowa, have issued catalog No. 64 of factory and mill supplies, machinists' and mechanics' tools, contractors' equipment, etc. The book, which is of standard 6 x 9-in. size and contains 1137 pages, is somewhat unusual in that it is alphabetically arranged like a directory. It is thus possible to turn to an item immediately without referring to an index, although an alphabetical index occupying eighteen pages is furnished as well. As an aid to the quick finding of any item, the articles listed on the pages are repeated at the top near the folios.

A description of the laboratories of the Mines Branch of the Canadian Department of Mines, Ottawa, Canada, is contained in Bulletin 13, just issued. The laboratories are equipped to make such chemical, mechanical and metallurgical investigations as are found expedient to aid the mining and metallurgical industry of Canada. The illustrations are copious and excellent.

Cambria Steel Company's Year

The fifteenth annual report of the Cambria Steel Company, for the year ended Dec. 31, 1915, presents the following comparative statement of income account:

| | 1915 | 1914 |
|--|-------------|-------------|
| Earnings | \$8,326,672 | \$8,115,932 |
| Less provision for depreciation and accruing renewals and exhaustion of minerals | 1,251,524 | 637,837 |
| Net earnings | \$7,075,148 | \$2,478,095 |
| Fixed charges | 671,610 | 517,105 |
| Net income | \$6,403,538 | \$1,960,990 |
| Dividends | 2,700,000 | 2,250,000 |
| Surplus for the year | \$3,703,538 | *\$289,010 |

*Deficit.

The company's surplus at the close of 1914 was \$20,231,165.78. From this a deduction was made of \$689,355.09, applicable to previous years, being the court award against the Cambria Iron Company in the Carnegie mixer suit, pending since 1895. Adding the surplus for 1915 and the company's proportion of undivided profits in subsidiaries, the total surplus at the close of 1915 was \$23,977,675.84.

Statistics of production and shipments in 1915, as compared with 1914, are as follows, in gross tons:

| | 1915 | 1914 |
|------------------------------------|-----------|-----------|
| Pig iron | 1,139,100 | 858,580 |
| Ingots | 1,452,276 | 1,188,240 |
| Shipments (finished product) | 1,021,462 | 783,922 |

From the accompanying remarks of President William H. Donner the following extracts are taken:

"The expenditures during the year charged to improvements were \$1,183,466.36, to equipment \$199,850.50, to extraordinary replacements and alterations \$529,037.06, and to relining blast furnaces and rebuilding coke ovens \$33,152.69 (aside from \$275,805 included in ordinary repairs of \$3,158,000), a total of \$1,945,506.61.

"Prior to 1915 this company had not solicited export business, but the conditions brought about by the European war made the foreign markets so attractive that it was decided to enter this field. The best results, it was thought, could be accomplished through a separate company that would handle the products of other mills, as well as Cambria's. This gives a greater variety and tonnage of products, justifying a more complete organization and enabling the company to take better care of its trade. In June, 1915, the American Steel Export Company was organized, 58 per cent of the stock being owned by the Cambria Steel Company. The Export Company secured desirable tonnages in foreign markets before the changed conditions of business in this country. Since the general improvement in domestic demand, the greater percentage of tonnage secured by the Export Company has been placed with outside mills. The American Steel Export Company shipped during the six months ended Dec. 31, 1915, 117,314 gross tons, of which 44 per cent was shipped by Cambria and the remainder by other mills.

"To insure the proper handling of the increased output from your ore properties, seven modern boats, with an average capacity of 10,000 tons each, have recently been purchased and will be controlled by your company through a majority stock ownership. The purchase of these boats on favorable terms will be quite an advantage and make the company independent in respect to Lake transportation.

"The war has eliminated the importation of steel more completely than was ever dreamed of under any proposed tariff and also gives us export orders that are unnatural, so that a phenomenal expansion in the industry is taking place, but it should not be forgotten that foreign competition will be a serious factor under the existing tariff whenever European manufacturers are ready for business and need the American markets.

"An important factor in the profits for the year has been the reduction in costs effected by many alterations and improvements throughout the works and the increased efficiency of your organization. Although wages have increased since 1912, Cambria's costs on finished products are fully \$3 per ton below those of any year prior to that time. Results, however, have been slow in developing, as it requires time to diagnose troubles

and economically make changes without seriously interrupting operations, and other improvements are needed. There are a number in contemplation which promise excellent returns.

"The prospects for the coming year are most promising and America's steel production for 1916 will undoubtedly establish a new record. Shipbuilding plants are all running to full capacity, and this industry should be busy for a number of years. Stocks of steel on hand, not only in this country, but throughout the world, need replenishing and it will take time for the production to catch up with the demand."

Lectures in Pittsburgh on Military Engineering

Plans are now under way for giving a series of five lectures on military engineering in Pittsburgh, probably at the Carnegie Institute. The Engineers' Society of Western Pennsylvania is taking an active part and the lectures are to be given by members of the corps of engineers of the United States Army, like the series of seven lectures now nearing a close in New York City. As in the case of the New York series, it is presumed that a considerable number of those taking the lectures will later on enter one of the training camps for the engineering branches of army service.

The following committee has been appointed to arrange for the lectures: Taylor Alderdice, vice-president National Tube Company; George S. Davison, president of the Gulf Refining Company; E. M. Herr, president of the Westinghouse Electric & Mfg. Company; Elmer K. Hiles, secretary Engineers' Society of Western Pennsylvania; Willis L. King, vice-president Jones & Laughlin Steel Company; Richard Khuen, Jr., resident engineer American Bridge Company; H. H. McClintic, vice-president and general manager McClintic-Marshall Company; William E. Mott, professor of civil engineering, Carnegie Institute of Technology; George H. Neilson, general manager Braeburn Steel Company, Braeburn, Pa.; R. L. O'Donnel, general superintendent Western Pennsylvania Division, Pennsylvania Railroad; H. A. Rapelye, F. N. Speller, metallurgical engineer, National Tube Company; J. M. Schoonmaker, vice-president Pittsburgh & Lake Erie Railroad; E. B. Taylor, vice-president Pennsylvania Company; E. J. Taylor, chief engineer Pittsburgh Coal Company; Samuel A. Taylor, consulting engineer, Pittsburgh; A. W. Thompson, S. L. Tone, second vice-president Pittsburgh Railways Company, and Homer D. Williams, president Carnegie Steel Company.

Farnsworth Steam Utilities

The Farnsworth Mfg. Company, with plant and office headquarters at 65 Beverly Street, Boston, Mass., succeeds the F. C. Farnsworth Company of 72 Trinity Place, New York. The new company will manufacture the several types of Farnsworth traps, boiler feeders, etc., and, with a modern plant, will be prepared to make very prompt delivery on all orders. F. C. Farnsworth is president, Howard W. Evans vice-president and general manager, and Kenneth L. Lindsey treasurer.

Mr. Farnsworth, who is the inventor of the Farnsworth traps and boiler feeders, has withdrawn from the engineering and contracting business at Bush Terminal, Brooklyn, and will devote his entire time to the development of the Farnsworth utilities, retaining the former office at 72 Trinity Place, New York. Mr. Evans, widely known for his ability as a power piping engineer, and with an excellent training in the management of some of the leading power piping houses in the West and East, will assume the management of the business at headquarters in Boston. Mr. Lindsey, the treasurer, is a prominent young Boston business man and a graduate of Harvard University.

The first Great Lakes launching of the season will take place March 25, when one of the 600-ft. steel freighters being built for the Interlake Steamship Company will take the water at the Lorain yard of the American Shipbuilding Company. The boat will be named the H. G. Dalton, after the president of the Interlake Company.

J. I. Case Shows Large Gain

Annual reports of agricultural implement manufacturers now appearing steadily add evidence of financial improvement in the state of their industry. The changes that have been effected in the relation of cash to inventories has since 1913 been especially striking. For the fiscal year ended Dec. 31, 1915, the J. I. Case Threshing Machine Company earned \$1,931,824 against \$966,697 in the previous year. After paying \$850,000 in preferred dividends and an appropriation of an additional \$500,000 for contingent losses, the 1915 earnings were equal to 7 per cent on the \$8,300,000 common stock.

The report presents a balance sheet as follows:

| Assets | | | |
|---|--------------|--------------|--|
| Real estate, patents, etc. | \$11,475,447 | \$11,154,008 | |
| Inventories | 6,744,115 | 8,997,791 | |
| Customers' notes | 15,737,141 | 15,669,859 | |
| Miscellaneous assets, accounts receivable, etc. | 1,441,860 | 784,030 | |
| Cash on hand | 1,522,421 | 596,765 | |
| Bond discount and selling expenses | 851,172 | 1,030,800 | |
| Total | \$37,772,160 | \$38,263,254 | |
| Liabilities | | | |
| Preferred stock | \$12,150,000 | \$12,150,000 | |
| Common stock | 8,300,000 | 8,300,000 | |
| First mortgage serial bonds | 9,500,000 | 10,587,267 | |
| Real estate mortgage | 43,633 | | |
| Bills payable | 1,010,000 | 2,050,000 | |
| Accounts payable | 886,377 | 693,301 | |
| Interest, taxes and accrued wages | 246,267 | 199,542 | |
| Reserve for contingent losses | 1,200,000 | 1,309,971 | |
| Depreciation, etc. | 2,081,384 | | |
| Surplus | 3,554,497 | 2,973,173 | |
| Total | \$37,772,160 | \$38,263,254 | |

Iron and Steel Institute Memberships

At the last meeting of the directors of the American Iron and Steel Institute, held on March 10, 1916, it was decided that transfer from the associate to the active list of members eligible for such transfer should be made on the basis of seniority of application, and alphabetically in the case of two or more persons making application on the same date. The principle of the transfer being thus established by the board, it was decided to leave the act of transfer and the notice thereof to the secretary, so as to expedite action and obviate bringing the matter before the directors. Duke N. A. Blacet stood first and succeeds A. D. Mixsell, deceased. Luciano Selmi, of the Corrigan, McKinney & Co., steel plant, Cleveland, stood second, and has been transferred to the active list to succeed Hardy Greenwood, of Dallas, Tex., resigned. By a strange coincidence, Morrow Chamberlain stood third and thereby has the privilege of succeeding his father, Capt. H. S. Chamberlain, who died last week.

Iron-Ore Imports and Exports in 1915

Iron-ore imports into the United States in 1915 were about the same as in 1914, and about one-half of those for 1913. The imports and exports are shown by the following Government data:

| | Imports, Gross Tons | Exports, Gross Tons |
|------|------------------------|------------------------|
| 1915 | 1,341,281 | 708,641 |
| 1914 | 1,350,588 | 551,618 |
| 1913 | 2,594,770 | 1,042,151 |

The exports in December were only 11,164 tons, against 102,838 tons in November. Export shipments are practically all to Canada.

The Sawyer Belt Hook Company of Pawtucket, R. I., on March 15 purchased the entire Thacher Hook business of Cleveland, Ohio, consisting of patterns, stock on hand, good will, etc. All of the outfit has been shipped to Pawtucket and all future deliveries will be made from that point. This acquisition will increase the output of the Pawtucket factory nearly 50 per cent.

The Midvale Steel & Ordnance Company has secured new offices at Chicago for the location of the combined staffs of the Midvale Steel Company, Cambria Steel Company and Worth Brothers Company, in the McCormick Building, 332 South Michigan Avenue.

Large Outlays for Ellwood City and Duquesne Improvements

An appropriation of \$1,500,000 recently authorized by the Steel Corporation provides for the construction of a 12-in. bar mill at the Duquesne works of the Carnegie Steel Company.

On page 727 of THE IRON AGE of Sept. 23, 1915, appeared an account of large extensions and additions to equipment to be made by the Shelby Steel Tube Company, Ellwood City, Pa. This company is a subsidiary of the United States Steel Corporation. A few days ago another appropriation of \$1,480,000 was made by the corporation for further extensions and improvements to this plant. These will consist of an additional piercing mill, another rolling mill, cold draw-benches, annealing furnaces and finishing machinery. These will permit the company to make seamless tubes of lighter gage and smaller diameters than heretofore. When all the additions and improvements to be made at Ellwood City shall have been completed, that plant will have an annual capacity of 145,000 tons of finished steel tube products.

New Open-Hearth Furnaces at Johnstown, Pa.

At the meeting of the board of directors of the Cambria Steel Company for the election of officers, held at Philadelphia, March 21, A. C. Dinkey was re-elected president, John C. Neale was elected vice-president in charge of sales and D. Brewer Gehly was re-elected secretary and treasurer. S. M. Vauclain, W. P. Barba and John C. Neale, recently elected directors to fill out the terms of resigning directors, were elected for the full term of three years.

In addition to another blast furnace, a block of new coke ovens and the opening of new coal mines—improvements which were announced recently—the Cambria Steel Company has decided to build four large open-hearth furnaces at its Franklin plant at Johnstown, Pa.

Engineers' Meeting at Cincinnati

The Cincinnati section of the American Society of Mechanical Engineers and the Engineers Club of Cincinnati held joint sessions March 16 at the Cincinnati Literary Club. James B. Stanwood, chairman of the Cincinnati section, presided. At the afternoon session papers were presented by A. J. M. Baker, whose subject was "The Sales Engineer in His Relation to Production and Machine Design," and by Paul Diserens, who discussed "Recent Developments in the Recovery of Casing-head Gasoline." In the evening Walter G. Franz made an address on "Why Is an Engineer?" followed by A. M. Sosa on the "Probable Future Requirements in Machine Tools." Lunch was served after the evening business session.

Official headquarters for the Society of Automobile Engineers, previous to sailing from Detroit on its annual summer cruise, June 12-16, have been arranged for at Hotel Pontchartrain, Detroit. Each of the six sections of the society will maintain headquarters in the hotel ball room previous to sailing. It is estimated that 550 engineers will be in attendance. Treasurer W. H. Conant has complete charge of tickets and reservations. Members reaching Detroit on Monday morning, June 12, will have an opportunity of visiting the different motor car and other factories.

The Bowling Green Scrap Material Company, Bowling Green, Ky., has opened for business at Eighth and College streets. The company will purchase scrap iron, etc. Louis Fleish is manager.

A Greenawalt iron-ore sintering plant is under construction at the Robeson Iron Company's furnace at Robeson, Pa. It will have a capacity of about 200 tons a day.

Iron and Steel Markets

LARGE RAIL CONTRACTS

Over 450,000 Tons Placed for 1917

Pig-Iron Buying Less Active—Some Users of Finished Steel Willing to Wait

Rail buying on a large scale for 1917 is the outstanding feature of the market. For the past week Chicago reports these contracts: 72,000 tons for the New York Central, 15,000 tons for the Union Pacific, 40,000 tons for the Chicago & Northwestern, 20,000 tons for the Burlington, 15,000 tons for the Missouri, Kansas & Texas, 35,000 tons for the Illinois Central, 12,000 tons for the Santa Fe, 15,000 tons for the Chesapeake & Ohio, 8000 tons for the Alton and 5000 tons for the Minneapolis & St. Louis. In addition are 75,000 tons for the B. & O., 15,000 tons for the Wheeling & Lake Erie, and an Eastern tonnage for the New York Central bringing its total up to 140,000 tons. The Pennsylvania order may come in within a week. The Boston & Maine is in the market for 15,000 tons, the Atlantic Coast Line for 15,000 tons and the Erie for about 40,000 tons.

The railroads pay no more for these rails than they have paid for years, and the placing of their orders now involves no risk and no judgment on the duration of the double and treble prices current for other forms of steel. Some of these rails will be rolled in 1916, but largely they are for next year and for spring delivery. Probably the total of recent lettings is 450,000 to 500,000 tons.

While the railroads are thus looking ahead, and there is heavy forward buying for vessel work, no less than 200,000 tons, chiefly plates and shapes, having been taken for that purpose for 1917, this week, there are signs that not all manufacturing buyers are being stampeded by the rapid advances. At Pittsburgh, while there is no less scrambling for early shipments, some manufacturing consumers show more willingness to hold off and take a chance on the market of six to nine months hence. How far the discussion of peace reports has to do with this attitude is all conjecture.

Various advances in price have come in the week and more are looked for, increasing buyers' dilemma due to the disparity between cost of material now being delivered and what must be paid in new contracts. Cold-rolled strip steel is \$5 a ton higher; skelp, \$2; wire rods, \$3 to \$5; rivets, \$2, and shafting, \$5; nuts and bolts, 10 per cent, and tin plate 25c. per base box to \$4.50.

More is heard of building plans laid aside or modified so as to use concrete. But a good deal of steel work is being given out for which steel is figured on a 1.80c. basis by fabricators covered by contracts. Some pipe work has been given up because of high prices, one New Jersey project in this

category calling for 10,000 tons and one at St. Louis for 7000 tons of plates.

The pressure upon warehouse stocks has increased, indicating that the mills have made no headway in relieving the situation. There have been fresh advances in warehouse plates and shapes.

The award of 4000 tons of steel work to the McClintic-Marshall Company for the Donner Steel Company, Buffalo, indicates the large scope of the extensions there. Besides the second blast furnace now under way, a third is to be built and a battery of coke ovens, as well as new docks. New rolling mills will follow.

Only slight and gradual relief is to be looked for in semi-finished steel, and no measurable increase in production is promised before the middle of the year. Rolling billets have sold at \$45 in the Central West and forging billets at \$65. For May and June deliveries of American billets the British market is \$55 at Liverpool, and at Glasgow \$65 has been quoted.

After three weeks of active buying the pig-iron movement has tapered off. The market has worked up an average of 50c. to \$1 in the operation, and a good many furnaces are now sold for six or seven months ahead. March transactions in the Chicago district have reached a total beyond 150,000 tons. At Pittsburgh a 15,000-ton contract for foundry and malleable iron has been closed, deliveries from January to December, 1917, at current prices. However, few furnaces are willing to sell for deliveries even reaching into next year.

A wide "spread" is developing between the \$175 contract price on ferromanganese for 1917 delivery and the basis of prompt sales, the latter being around \$400. But the \$175 contracts are so hedged with conditions that the buyer has little assurance either as to price or delivery. An eastern Pennsylvania furnace is to be turned to ferromanganese; in other directions, also, there are plans for increasing output, and all will be needed.

Pittsburgh

PITTSBURGH, PA., March 21, 1916.

For the first time since the runaway steel market started, we have advices from several of the larger steel mills that consumers are showing a disposition to hold off from placing contracts for delivery late this year and early next year, stating that they prefer to take chances on prices, and also on deliveries, when the time comes that the material should be needed. It seems that prices can hardly go much higher than they are now, and should peace negotiations start, a readjustment of the entire steel market would likely take place. Several advances in prices were made last week. Cold-rolled strip steel was marked up about \$5 per ton; tin plate, fully 25c. per base box; rivets, \$2 per ton; skelp, \$2; wire rods, \$3 to \$5; shafting, \$5, and nuts and bolts, 10 to 15 per cent. Steel mills state that the new demand is still very insistent and pressure on the mills for deliveries are as strong as ever. However, the opinion that prices have possibly reached the crest is getting stronger. Makers of structural shapes believe a good deal of work is being held back on account of the high prices, but perhaps also because

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

| | Mar. 22, | Mar. 15, | Feb. 23, | Mar. 24, |
|---------------------------------|----------|----------|----------|----------|
| Pig Iron, Per Gross Ton: | 1916. | 1916. | 1916. | 1915. |
| No. 2 X, Philadelphia... | \$20.00 | \$20.00 | \$20.00 | \$14.25 |
| No. 2, Valley furnace... | 18.50 | 18.50 | 18.25 | 13.00 |
| No. 2 Southern, Cin'ti... | 17.90 | 17.90 | 17.90 | 12.15 |
| No. 2, Birmingham, Ala. | 15.00 | 15.00 | 15.00 | 9.25 |
| No. 2, furnace, Chicago* | 10.00 | 18.50 | 18.50 | 13.00 |
| Basic, del'd, eastern Pa. | 19.50 | 19.50 | 19.50 | 13.50 |
| Basic, Valley furnace... | 18.25 | 18.25 | 17.75 | 12.50 |
| Bessemer, Pittsburgh... | 21.95 | 21.95 | 20.70 | 14.55 |
| Malleable Bess., Ch'go* | 19.50 | 19.50 | 19.00 | 13.00 |
| Gray forge, Pittsburgh... | 18.45 | 18.45 | 18.45 | 13.45 |
| L. S. charcoal, Chicago... | 19.75 | 19.75 | 19.75 | 15.75 |

| | | | | |
|-------------------------------------|-------|-------|-------|-------|
| Billets, etc. Per Gross Ton: | 45.00 | 45.00 | 35.00 | 20.00 |
| Bess. billets, Pittsburgh... | 45.00 | 45.00 | 35.00 | 20.00 |
| O.-h. sheet bars, P'gh... | 45.00 | 45.00 | 35.00 | 21.00 |
| Forging billets, base, P'gh | 65.00 | 65.00 | 55.00 | 25.00 |
| O.-h. billets, Phila... | 50.00 | 50.00 | 42.00 | 21.52 |
| Wire rods, Pittsburgh... | 57.00 | 55.00 | 50.00 | 25.00 |

| | | | | |
|---------------------------------|--------|--------|--------|--------|
| Finished Iron and Steel, | | | | |
| Per Lb. to Large Buyers: | Cents. | Cents. | Cents. | Cents. |
| Bess. rails, heavy, at mill | 1.25 | 1.25 | 1.25 | 1.25 |
| Iron bars, Philadelphia... | 2.559 | 2.559 | 2.409 | 1.15 |
| Iron bars, Pittsburgh... | 2.40 | 2.40 | 2.25 | 1.10 |
| Iron bars, Chicago... | 2.15 | 2.15 | 1.90 | 1.12½ |
| Steel bars, Pittsburgh... | 2.75 | 2.75 | 2.50 | 1.15 |
| Steel bars, New York... | 2.919 | 2.919 | 2.669 | 1.319 |
| Tank plates, Pittsburgh... | 3.50 | 3.00 | 2.75 | 1.10 |
| Tank plates, New York... | 3.009 | 3.419 | 3.169 | 1.269 |
| Beams, etc., Pittsburgh... | 2.50 | 2.50 | 2.25 | 1.15 |
| Beams, etc., New York... | 2.619 | 2.619 | 2.419 | 1.269 |
| Skelp, grooved steel, P'gh | 2.30 | 2.20 | 2.00 | 1.10 |
| Skelp, sheared steel, P'gh | 2.40 | 2.30 | 2.10 | 1.15 |
| Steel hoops, Pittsburgh... | 3.00 | 2.75 | 2.50 | 1.25 |

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

| | | | | |
|--------------------------------|--------|--------|--------|--------|
| Sheets, Nails and Wire, | | | | |
| Per Lb. to Large Buyers: | Cents. | Cents. | Cents. | Cents. |
| Sheets, black, No. 28, P'gh | 2.75 | 2.75 | 2.60 | 1.80 |
| Galv. sheets, No. 28, P'gh | 4.75 | 4.75 | 4.75 | 3.40 |
| Wire nails, Pittsburgh... | 2.40 | 2.40 | 2.30 | 1.60 |
| Cut nails, Pittsburgh... | 2.30 | 2.30 | 2.20 | 1.55 |
| Fence wire, base, P'gh... | 2.25 | 2.25 | 2.15 | 1.40 |
| Barb wire, galv., P'gh... | 3.25 | 3.25 | 3.15 | 2.10 |

| | | | | |
|-------------------------------------|-------|-------|-------|-------|
| Old Material, Per Gross Ton: | 18.00 | 18.00 | 17.25 | 12.00 |
| Iron rails, Chicago... | 18.00 | 18.00 | 17.25 | 12.00 |
| Iron rails, Philadelphia... | 20.00 | 20.00 | 19.50 | 13.00 |
| Carwheels, Chicago... | 14.50 | 14.50 | 13.50 | 9.75 |
| Carwheels, Philadelphia... | 16.50 | 16.50 | 16.50 | 11.00 |
| Heavy steel scrap, P'gh... | 19.00 | 19.00 | 17.00 | 12.00 |
| Heavy steel scrap, Phila... | 17.00 | 17.00 | 16.50 | 11.00 |
| Heavy steel scrap, Ch'go... | 16.75 | 16.75 | 14.75 | 9.25 |
| No. 1 cast, Pittsburgh... | 16.25 | 16.00 | 15.25 | 12.00 |
| No. 1 cast, Philadelphia... | 17.00 | 17.00 | 17.00 | 12.00 |
| No. 1 cast, Ch'go (net ton) | 13.50 | 13.50 | 12.75 | 9.00 |

| | | | | |
|--|--------|--------|--------|--------|
| Coke, Connellsville, Per Net Ton at Oven: | \$3.50 | \$3.35 | \$3.50 | \$1.50 |
| Furnace coke, prompt... | \$3.50 | \$3.35 | \$3.50 | \$1.50 |
| Furnace coke, future... | 3.00 | 3.00 | 2.50 | 1.65 |
| Foundry coke, prompt... | 3.75 | 3.75 | 3.50 | 2.00 |
| Foundry coke, future... | 3.50 | 3.50 | 3.25 | 2.15 |

| | | | | |
|------------------------------|--------|--------|--------|--------|
| Metals, | | | | |
| Per Lb. to Large Buyers: | Cents. | Cents. | Cents. | Cents. |
| Lake copper, New York... | 27.12½ | 27.00 | 27.37½ | 16.00 |
| Electrolytic copper, N. Y. | 26.87½ | 26.37½ | 27.25 | 15.37½ |
| Spelter, St. Louis... | 17.75 | 16.50 | 21.25 | 9.35 |
| Spelter, New York... | 18.00 | 16.75 | 21.50 | 9.50 |
| Lead, St. Louis... | 8.00 | 7.37½ | 6.22½ | 4.05 |
| Lead, New York... | 8.00 | 7.25 | 6.30 | 4.10 |
| Tin, New York... | 49.62½ | 54.00 | 42.20 | 50.50 |
| Antimony, Asiatic, N. Y. | 45.00 | 44.00 | 44.00 | 32.00 |
| Tin plate, 100-lb. box, P'gh | \$4.25 | \$4.25 | \$4.00 | \$3.35 |

of the filled-up condition of the steel mills and fabricating shops: It is realized that there is no encouragement for capital to go into large building schemes at present.

Pig Iron.—A local consumer has bought upward of 15,000 tons of malleable Bessemer and foundry iron for delivery over all of 1917, shipments to start in January. Prices paid are said to have been approximately those now ruling. It is understood the business was placed with two Cleveland concerns. Prices on basic are a little firmer, but while most sellers are quoting \$18.50, Valley, one or two interests are still naming \$18.25, and this might be shaded on a firm offer. It is still the belief here that pig-iron prices will be higher in the next two or three months. New duplexing plants and open-hearth furnaces here and in nearby districts will be needing large lots of basic iron by July or shortly after, so that a scarcity in its supply is expected. Prices on foundry iron are only fairly strong, due to the fact that some foundries who have iron due them on contracts are offering it for resale on account of the molders' strike at about 25c. per ton less than the furnaces are quoting. We quote Bessemer iron at \$21; basic iron, \$18.25 to \$18.50, some sellers asking \$19; gray forge, \$17.50 to \$17.75; malleable Bessemer, \$18.50 to \$19, and No. 2 foundry, \$18.50 to \$19, all at Valley furnace, the freight rate being 95c. per ton for delivery in the Cleveland and Pittsburgh districts.

Billets and Sheet Bars.—Bessemer and open-hearth billets for prompt delivery are now quoted firmly at \$45, maker's mill, and in some cases higher. There are no signs of the shortage in semi-finished steel being relieved in the near future. For reasonably prompt delivery we quote: Bessemer billets, \$45; open-hearth billets, \$45; Bessemer sheet bars, \$45, and open-hearth sheet bars, \$45, maker's mill, Pittsburgh or Youngstown districts. We quote forging billets at \$65 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take \$1 extra.

Steel Rails.—Only current orders for standard sections are being placed. It is said the mills are not particularly anxious to book contracts for rails at present, as they are able to sell their steel in other forms at

much higher prices. The new demand for light rails is active, both from the coal mining and the lumber interests, but from the traction companies is light. New orders and specifications booked last week by the local interests for light rails were over 5000 tons. We quote light rails as follows: 25 to 45 lb. sections, 1.85c.; 16 and 20 lb., 1.90c.; 12 and 14 lb., 1.95c., and 8 and 10 lb., 2c., in carload lots. An advance of 5c. per 100 lb. is charged for less than carloads and down to three tons, while under three tons an additional 5c. is charged. We quote standard section rails of Bessemer stock at 1.25c. and of open-hearth steel, 1.34c., Pittsburgh.

Ferroalloys.—It is practically impossible to find ferromanganese for prompt shipment at any price. It is said stocks of some of the smaller steel works are about used up and they may have to shut down. Reports are that several carloads of prompt 80 per cent were sold last week at \$425 to a consumer who paid this price rather than shut his mill down. Large consumers who make their own supply firmly refuse to sell and stocks are about exhausted. The nominal price of English 80 per cent is \$175, seaboard, but this is subject to confirmation by makers on the other side. No speigeleisen is to be had for delivery before second half, for which it is quoted at \$60 at furnace for 18 to 22 per cent. The blast furnace of the Dunbar Furnace Company, Dunbar, Pa., and that of the New Jersey Zinc Company, Newport, Pa., are running on spiegeleisen. Nominal prices on 50 per cent ferrosilicon are \$85 up to 100 tons; over 100 tons and up to 600 tons, \$84; and over 600 tons, \$83, all per gross ton, f.o.b. Pittsburgh. Prices of Bessemer ferrosilicon for delivery over remainder of the year are as follows: 9 per cent, \$30; 10 per cent, \$31; 11 per cent, \$32; 12 per cent, \$33; 13 per cent, \$34.50; 14 per cent, \$36.50; 15 per cent, \$38.50, and 16 per cent, \$41. Seven per cent silvery for the same delivery is \$26.50; 8 per cent, \$27; 9 per cent, \$27.50; 10 per cent, \$28; 11 per cent, \$29, and 12 per cent, \$30. All these prices are f.o.b. at furnace, Jackson, Ohio; New Straitsville, Ohio, or Ashland, Ky., each of these points having a freight rate of \$2 per gross ton to Pittsburgh.

Structural Material.—New inquiry is heavy and some large jobs have been placed. The McClintic-Marshall Company has taken about 4000 tons for a new open-

hearth steel building for the Donner Steel Company, Buffalo, about 400 tons for an extension to the plant of the New York Shipbuilding Company, Camden, N. J., and 1000 tons for a factory building for the Michigan Stamping Company, Detroit, Mich. The American Bridge Company has taken 1000 tons more for new steel buildings for the Firestone Tire & Rubber Company, Akron, Ohio, making 2500 tons for this plant; 2500 tons for new steel buildings for the Toledo Gas Company, Charleston, W. Va., and 900 tons of bridge work for the Baltimore & Ohio Railroad at Defiance, Ohio. The Fort Pitt Bridge Works has taken 600 tons of bridge work for the Pennsylvania Lines West, and the Massillon Bridge & Structural Company, about 2500 tons for new steel buildings for Hubbard & Co., Pittsburgh. We quote beams and channels up to 15 in. at 2.50c. to 2.75c. at mill, prices depending on deliveries wanted.

Plates.—No large orders for cars were placed in the past week, but the two local car companies report their shops filled for the next four or five months. The Pressed Steel Car Company has taken 100 refrigerator cars and the Barney & Smith Car Mfg. Company 500 box cars, and 300 flat cars for the Atlantic Coast Line. The Great Northern is in the market for 1000 box cars and the Chicago & Northwestern for 2000 box cars to replace an inquiry for 2000 steel underframes, recently withdrawn from the market. Plate mills are filled up for months ahead. The nominal price of $\frac{1}{4}$ -in. and heavier plates for shipment at convenience of the mill is 2.50. to 2.60c.; for delivery in two or three months; 3c. to 3.50c.; and, it is said, plates in small lots for shipment in six to eight weeks have sold above 4c. at mill.

Sheets.—New demand is very urgent, notably for blue annealed, electrical and special sheets, on which several large makers state they are practically sold up for the remainder of the year. Buying of sheets by automobile builders has been much heavier this year than ever before, and they have paid much higher prices. Several large mills state they have only a few light gage black sheets and some galvanized sheets to sell for delivery over the last half of this year. Prices are very strong. We quote Nos. 9 and 10 blue annealed sheets, 2.90c.; No. 28 Bessemer black, 2.75c. to 2.85c.; open-hearth, 2.85c. to 2.95c.; No. 28 galvanized, Bessemer stock, 4.75c. to 4.85c., and open-hearth, 4.85c. to 5c., most of the mills holding for the higher figure. We quote Nos. 22 and 24 black plate, tin mill sizes, H. R. and A., 2.60c.; Nos. 25, 26 and 27, 2.65c.; No. 28, 2.75c.; No. 29, 2.85c., and No. 30, 2.90c. These prices are for carloads and larger lots, f.o.b. maker's mill.

Tin Plate.—The current demand is heavy. One leading maker sold recently several lots of bright plate out of stock for prompt shipment at \$4.50 per base box. Other interests are quoting \$4.50 for delivery in last quarter of this year. The official price remains at \$4 per base box, but none of the mills would sell at this figure, quoting \$4.25 and some \$4.50. Mills have actual specifications to take their output over the next five or six months. We now quote 14 x 20 coke plates at \$4.25 to \$4.50 per base box. Prices onterne plate have been advanced 15c. per single box, and we now quote 8-lb. coated ternes at \$7.50 for 200 lb., and \$7.80 for 214 lb., all f.o.b. maker's mill, Pittsburgh.

Rivets.—Effective from Monday, March 20, prices on rivets were again advanced \$2 per ton. Makers state they can hardly get any material from the steel mills and average prices paid by some of the rivet makers on steel bars range from 2.75c. to 3c. and higher. A local maker recently shipped three carloads of rivets to India and Africa, getting a special permit to put them through. All the makers are back in deliveries and new demand is heavy. We now quote structural rivets, $\frac{1}{2}$ in. and larger, at \$3.25 per 100 lb. base, and conehead boiler rivets \$3.35, f.o.b. Pittsburgh, terms 30 days net, or one-half of 1 per cent off for cash in 10 days.

Cold-Rolled Strip Steel.—New lists of extras on cold-rolled strip steel have been prepared and are being sent out this week for approval. Prices are very strong and demand is urgent. We note a sale of 300 tons for delivery at convenience of the mill at \$6 base and 20 tons at \$5.75 base. We quote cold-rolled strip steel at

\$5.50 minimum to \$6 base, all f.o.b. mill, Pittsburgh. Extras that are standard with all the makers, but which will be changed in the next few days, are in part as follows:

Base price for $1\frac{1}{2}$ -in. and wider, hard, in coils, 0.10 to 0.19 carbon.

| Thickness | 0.100-in. and thicker | 0.050-in. to 0.099-in. | 0.036-in. to 0.049-in. | 0.035-in. | 0.031-in. to 0.034-in. | 0.026-in. to 0.030-in. | 0.020-in. to 0.024-in. |
|---|-----------------------|------------------------|------------------------|-----------|------------------------|------------------------|------------------------|
| Extra for thickness.... | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| Extra for annealing.... | 0.25 | 0.25 | 0.25 | 0.25 | 0.40 | 0.40 | 0.40 |
| Width Extras | | | | | | | |
| Under $1\frac{1}{2}$ to 1-in. inc. | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| Under 1 to $\frac{3}{4}$ -in. inc. | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| Wider than 6, not over 9-in. | | | | | | | 0.25 |
| Wider than 9, not over 12-in. | | | | | | | 0.25 |
| Wider than 12, not over 15-in. | | | | 0.25 | 0.25 | 0.25 | 0.50 |
| Cut Lengths Extra | | | | | | | |
| 1-in. and wider..... | 0.10 | 0.15 | 0.15 | 0.15 | 0.25 | 0.40 | 0.50 |
| Under 1-in. to our limits | 0.25 | 0.50 | 0.50 | 0.50 | 0.75 | 0.75 | 0.75 |
| Reductions for carload lots of a size. For orders 18 tons or over, one width and gage, shipment at one time, there is a regular reduction from the net price of 15c. per cwt. | | | | | | | |
| For all tempers other than full hard for flat work add annealing extra. | | | | | | | |

Skelp.—The demand is very active and skelp mills are sold up to third quarter. Prices are very strong and slightly higher. We now quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

Railroad Spikes.—Specifications from railroads are only fair, but from jobbers are heavy. The demand for boat spikes is very active and mills are back in deliveries several months. Prices are strong, one maker quoting as high as \$2.65 on railroad spikes. We quote:

Standard railroad spikes, $4\frac{1}{2}$ x 9/16 in. and larger, \$2.50; railroad spikes, $\frac{1}{2}$ and 7/16 in., \$2.60 base; railroad spikes, $\frac{3}{8}$ in. and 5/16 in., \$2.90 base; boat spikes, \$2.65 base, all per 100 lb., f.o.b. Pittsburgh.

Nuts and Bolts.—Effective March 16, prices on nuts and bolts were advanced from 10 to 15 per cent by all makers, who state that the continued advances in prices on raw material have made higher prices on nuts and bolts imperative. The demand is abnormally heavy, while deliveries of steel from the mills are very unsatisfactory. The new discounts, which are stated to be for prompt acceptance only, are as follows, delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb.:

Machine bolts, h. p. nuts, small, rolled thread, 60, 10 and 5 per cent; small, cut thread, 60 and 10; large, 50 and 10.

Machine bolts, c. p. c. and t. nuts, small, 60 per cent; large, 45.

Carriage bolts, small, rolled thread, 60 and 10 per cent; small, cut thread, 60 and 5; large, 50.

Blank bolts, 50 and 10 per cent. Bolt ends, h. p. nuts, 50 and 10; with c. p. nuts, 45. Rough stud bolts, 30. Tap screws (cone or gimlet point), 65. Forged set screws and tap bolts, 25 per cent.

Nuts, tapped or blank, h. p. square, \$3.25 off; h. p. hex., \$3.25 off; c. p. c. & t. sq. nuts, tapped or blank, \$3.50 off; c. p. c. & t. hex., \$3.50 off. Semi-finished hex. nuts, 70, 10 and 10 per cent; finished and case hardened nuts, 70 and 10.

Rivets, 7/16-in. diameter and smaller, 60.

Wire Rods.—It is very hard to obtain rods at any price, the supply available for the open market being light. It is said some consumers who had to have rods for fairly prompt shipment have paid \$60 or higher. We quote Bessemer, open-hearth and chain rods at \$57 to \$60.

Wire Products.—There is a decided shortage in 8d. and 10d. wire nails. Premiums of 10c. per keg for wire nails are readily obtainable by any mill in position to make fairly prompt shipment. It is said two mills are quoting wire nails at \$2.50 base and are entering orders. It is believed there will be another advance of at least \$2 per ton on wire products within the next few days. Demand is heavy and on active export inquiries local mills are not quoting, desiring to give their product to domestic customers. Prices quoted by the mills at this writing to domestic consumers for delivery in three to four months are as follows: Wire nails, \$2.40; galvanized, 1 in. and longer, taking an advance over this price of \$2, and shorter than 1 in., \$2.50; plain annealed

wire, \$2.25; galvanized barb wire and fence staples, \$3.25; painted barb wire, \$2.55; polished fence staples, \$2.55; cement coated nails, \$2.40, base, all f.o.b., Pittsburgh, with freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are now 61½ per cent off list for carload lots; 60½ per cent for 1000-rod lots and 59½ per cent for small lots, f.o.b., Pittsburgh.

Shafting.—Cold-rolled shafting in carload lots is now squarely on a 25 per cent off basis, and sales of small lots for fairly prompt shipment have been made at base price or very close to it. Makers are loaded with orders for five or six months ahead and are far back in deliveries, partly due to inability to get steel bars promptly from the mills. We quote cold-rolled shafting at 25 per cent off in carloads and 20 per cent in less than carloads, freight added to point of shipment.

Iron and Steel Bars.—There is an insistent heavy demand for both iron and steel bars, and on the latter mills are sold up for practically the remainder of this year. On iron bars the mills are making slightly better deliveries, but are filled up for two or three months. We quote steel bars at 2.50c. for delivery at convenience of the mill and 2.75c. to 3c. for delivery in third quarter. It is said that bars have sold at 3.50c. at mill for second quarter delivery. We quote refined iron bars at 2.40c. to 2.50c. and railroad test bars at 2.50c. to 2.60c., f.o.b., Pittsburgh. Warehouse prices on bars, plates and shapes in small lots for shipment from stock are as follows: Structural shapes, 3.10c., plates, 3.50c.; flats, rounds and squares, under 2 in. in diameter, 3.20c.; rounds and squares, 2 in. and over, 3.75c.; ¾-in. reinforcing bars, 3.25c.

Hoops and Bands.—All mills are quoting hoops at 2.75c. and steel bands about 2.50c. for such deliveries as they can make in third and fourth quarters. For delivery in eight to ten weeks hoops have sold at about 3c. and bands 2.75c. We quote steel hoops at 2.75c. and bands at 2.50c. for delivery at convenience of the mill, and for shipment in eight to ten weeks we quote steel hoops at 3c. and bands at 2.75c. at mill.

Merchant Steel.—Mills are sold up for three to four months and far back in shipments. Prices on small lots are about as follows: Iron finished tire, ½ x 1½ in. and larger, 2.35c., base; under ½ x 1½ in., 2.50c.; planished tire, 2.55c.; channel tire, ¾ to ¾ and 1 in., 2.85c. to 2.95c.; 1 x ½ in. and larger, 3.25c.; toe calk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finish, 2.75c.

Carwheels.—The two local makers have recently taken heavy orders for forged steel wheels for new cars from the New York Central and the Southern railroads. They are said to be filled up for the remainder of this year and to have orders on their books for first quarter of 1917. We quote 33-in. freight carwheels in lots of 1000 or more at \$18; 33-in. tender wheels, \$22; 36-in. passenger or tender wheels, \$26. These prices are based on a 10-in. diameter hub, 50c. extra being charged for 11-in., all f.o.b., Pittsburgh.

Wrought Pipe.—The demand for iron and steel pipe has reached the point where some mills are refusing to quote for delivery earlier than July or August, and are specifying that the price ruling on the first day of each month shall be the price for shipments in that month. All the mills are far back in deliveries. A local mill has taken 20 miles of 8-in. steel pipe, plain ends, for mid-continent delivery, and there is an inquiry out for 12 miles of 8-in. for West Virginia delivery. Discounts in effect on black and galvanized iron and steel pipe are given on another page.

Boiler Tubes.—Prices are very strong and another advance is looked for in the near future. Mills making locomotive and merchant tubes are sold up for three or four months and on seamless steel tubing for the remainder of the year. Discounts now in effect on iron and steel tubes are given on another page.

Old Material.—It is estimated that the Carnegie Steel Company in the past three weeks has bought for itself and allied interests fully 125,000 tons or more of heavy steel scrap, but for none of which it paid above

\$18.50 per gross ton, delivered. Some dealers who sold heavily to the company have paid \$19 to \$19.25 to cover their short sales. It is said the supply of scrap is limited and dealers who have stocks are inclined to hold them, believing the market will be higher. We note sales of 5000 to 18,000 tons of heavy steel scrap made about a week ago at \$18.50, delivered, and 3500 to 4000 tons of low phosphorus melting stock at \$20.75 to \$21, delivered. There is a heavy demand for turnings for blast-furnace purposes. We have advanced prices on nearly all grades 50c. to \$1 or more. Dealers now quote for delivery in the Pittsburgh and nearby districts that take the same rates of freight, as follows, per gross ton:

| | |
|---|--------------------|
| Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivered | \$19.00 to \$19.50 |
| Hydraulic compressed bundled sheet scrap | 16.50 to 17.00 |
| No. 1 foundry cast | 16.25 to 16.50 |
| Bundled sheet scrap, side and ends, f.o.b. consumers' mills, Pittsburgh district | 14.75 to 15.00 |
| Retrolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa. | 18.50 to 19.00 |
| Bundled sheet stamping scrap | 15.00 to 15.25 |
| No. 1 railroad malleable stock | 16.00 to 16.25 |
| Railroad grate bars | 10.50 to 10.75 |
| Low phosphorus melting stock | 20.75 to 21.00 |
| Iron car axles | 25.50 to 26.00 |
| Steel car axles | 22.50 to 23.00 |
| Locomotive axles, steel | 25.00 to 25.50 |
| No. 1 busheling scrap | 15.25 to 15.50 |
| Machine-shop turnings | 11.00 to 11.25 |
| Cast-iron borings | 14.50 to 14.75 |
| *Sheet bar crop ends | 13.00 to 13.50 |
| No. 1 railroad wrought scrap | 19.00 to 19.25 |
| Heavy steel axle turnings | 13.50 to 14.00 |
| Heavy breakable cast scrap | 14.75 to 15.00 |

*Shipping point.

Coke.—Coke makers report the car situation better, but they are all somewhat behind in deliveries. A local interest reports a sale last Saturday of about 20 cars, or 600 tons, of high grade blast furnace coke at \$3.75 per net ton at oven. No inquiries for blast furnace coke are in the market for last half, but makers of the best grades are holding it for \$3 per net ton at oven for such delivery. We quote standard makes of blast furnace coke for prompt shipment at \$3.50 to \$3.75 and on contracts for last half \$3 per net ton at oven. We quote standard grades of 72-hr. foundry coke for prompt shipment at \$3.75 to \$4, and on contracts \$3.50 to \$3.75. The Connellsville *Courier* gives the output of coke for the week ended March 11 as 457,894 net tons, an increase over the previous week of 13,552 tons.

Chicago

CHICAGO, ILL., March 22, 1916.—(By Wire.)

Rail contracts for 1917 delivery by Western railroads have been increased to at least 300,000 tons through the placing last week of more than 200,000 tons. This forehandedness anticipates the customary season of rail contracting for the ensuing year by about six months. If the buying of other forms of steel equally distant into the future were being done at prices comparable with the price of rails, that too might be considered forehanded, but on the basis of 2.50c., Chicago, such purchases have in them an element of the precarious. But caution is not being entirely disregarded. Architects report an increasing number of their clients who have abandoned building projects requiring structural steel or are attempting to work out designs in reinforced concrete. Many manufacturers who are large users of steel will, it seems assured, curtail their production if, at the expiration of low-price contracts in force through the first half, it is still necessary to pay the current scale of prices. With respect to the availability of steel, the situation has not changed in any important particular. On the basis of 3.25c., Pittsburgh, plates can be had in from six to eight weeks, bars at 2.75c., black sheets at 2.85c., and blue annealed sheets at 3c. in about the same time. In small tonnages at stock prices fabricated structural material can still be secured with reasonable promptness, but mill shipments of plain material are long delayed. New discounts are in force for bolts; rivets have been advanced \$2 per ton; store prices are up \$4 per ton for shapes

and bars, \$7 for plates and from \$2 to \$5 for sheets. Pig-iron melters appear quite unmindful of the high level of metal cost which they are establishing for themselves, not only through this year but into 1917, and the buying of foundry and malleable iron runs on at a pace that will make new sales records for some of the furnaces in March. Sales of heavy melting steel scrap last week bore out what was forecasted with respect to prices a week ago, and \$17 is understood to have been the highest price paid by a large consumer.

Pig Iron.—Sales last week maintained the gait that has piled up orders since March 1 for one distributor, totaling approximately 75,000 tons, and for another nearly as much. The apparent willingness of the foundries to come into the market repeatedly and for tonnages that will engage their melting capacities for months to come, notwithstanding the high level of prices, may only be attributed to a heavy demand for castings. Buying has been at prices ranging from \$18.50 at Chicago furnaces for foundry iron to \$19.50 for malleable, a purchase of 5000 tons of high silicon basic by a Tri-City foundry at \$18 being a sale of convenience, rather than a representative transaction. The sales of malleable into 1917 at \$19.50 are a particular evidence of the temper of the market. The price of local foundry iron was advanced a peg last week to the basis of \$19 at furnace for silicon 1.75 to 2.25 per cent, but the larger purchases of the week, ranging from 2500 to 5000 tons, were closed on the basis of \$18.50. The sale of 8000 tons of Northern iron to implement interests is noted at a price equivalent to \$15, Birmingham. Other large users of pig iron have been buying freely and without bringing out evidence of anything but exceptional strength in the market. Charcoal iron alone is moving slowly. The 2000 or 3000 tons of spiegeleisen and ferromanganese that have been offered from the South Chicago furnace that will blow in on alloys about April 10 has already been snapped up, the ferromanganese bringing prices equivalent to \$4 a unit. For Lake Superior charcoal iron, we quote delivery prices at Chicago to include a freight rate of \$1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

| | |
|--|------------------|
| Lake Superior charcoal, Nos. 2 to 5..... | \$19.75 |
| Lake Superior charcoal, No. 1..... | 20.25 |
| Lake Superior charcoal, No. 6 and Scotch.... | 20.75 |
| Northern coke foundry, No. 1..... | 19.50 |
| Northern coke foundry, No. 2..... | 19.00 |
| Northern coke foundry, No. 3..... | 18.50 |
| Southern coke, No. 1 f'dry and 1 soft..... | \$19.50 to 20.00 |
| Southern coke, No. 2 f'dry and 2 soft..... | 19.00 to 19.50 |
| Malleable Bessemer | 19.50 |
| Basic | 19.00 |
| Low phosphorus | 34.00 to 36.00 |
| Silvery, 8 per cent..... | 29.50 |
| Bessemer ferrosilicon, 10 per cent..... | 33.50 |

(By Mail)

Rails and Track Supplies.—There has been added to rail tonnage, previously contracted for in this market for 1917 delivery, about 200,000 tons, not including some 10,000 tons of Bessemer rails. The important participants in this buying were the New York Central, 70,000; Chicago & Northwestern, 40,000; Illinois Central, 35,000; Burlington, 20,000. The Santa Fé, Missouri, Kansas & Texas and Minneapolis & St. Louis were also among the buyers. This brings the aggregate of 1917 rails already bought in this district to approximately 300,000 tons. We quote standard railroad spikes at 2.60c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie plates, \$45, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.61c.; 16 to 20 lb., 1.66c.; 12 lb., 1.71c.; 8 lb., 1.76c.; angle bars, 1.50c. to 1.75c., Chicago.

Structural Material.—In view of the high level of prices, a rather surprising number of structural contracts are reported, the past week bringing out eight jobs for a total of about 7900 tons. Some of the prices for the fabricated material were not as high as might be anticipated, one job of something over 700 tons going for less than \$65 per ton. From this, it would seem that, aside from such profit as they are getting

out of the advance in the price of plain material, the fabricators are asking little, if any, increased shop profits. Among the contracts reported were 2600 tons for another Crane Company addition, 600 tons for a Fort Wayne Electric Company building and 100 tons for the Martin Apartment, Chicago, all taken by the American Bridge Company. The Wisconsin Bridge & Iron Company took 2600 tons for the new main exchange of the Wisconsin Telephone Company, Milwaukee. The Decatur Bridge Company will fabricate 300 tons for the Granby Mining & Smelting Company; the Milwaukee Bridge Company, 600 tons for the Chicago & Eastern Illinois Railroad; the King Bridge Company, 740 tons for the Burlington Railroad and the Worden-Allen Company 200 tons for the Montreal Mining Company at Hurley, Wis. The Burlington Railroad is in the market for about 700 tons of additional bridge steel. We quote for Chicago delivery of plain material from mill 2.539c.

The price of structural steel from stock has been advanced \$4 per ton and we quote for Chicago delivery from store 3.10c.

Plates.—The demand for plates for miscellaneous purposes continues and while some sources of supply, offering deliveries in from six to eight weeks, are still open to the buyer, this delivery commands a minimum price of 3.25c., Pittsburgh. For contract plates this market has not followed the maximum quotation of 2.75c. for 1917 delivery. The New York Central placed its order for 1000 gondolas last week. We quote for Chicago delivery of plates from mill 2.789c. for forward delivery and 3.439c. for early shipment.

Chicago jobbers have advanced quotations for plates out of stock \$7 per ton and we now quote for Chicago delivery 3.50c.

Sheets.—Inquiry for sheets in the past week has been an interesting indicator of the wide search for material wherever it may be had. Eastern buyers have been seeking to place orders in this market for a considerable range of sizes. The demand continues more particularly for the heavier gages, the business in black sheets being comparatively limited. For galvanized sheets from mill there is practically no market. The wide range of quotations for black sheets is still reported, but a number of sales at 2.85c., Pittsburgh, point to this price as the minimum. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.189c.; box material, No. 17 and lighter, 3.039c. to 3.189c.; No. 28 galvanized, 4.939c. to 5.189c.

Prices of sheets out of store have been again advanced and we quote for Chicago delivery from jobbers' stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.25c.; No. 28 black 3.10c. to 3.20c.; No. 28 galvanized, 5.40c. to 5.50c.

Bars.—The difficulty encountered in satisfying inquiry for mild steel reinforcing bars is adding to the use of high-carbon steel for that purpose and some interesting transactions are reported where rail steel has been accepted for work usually let under strict mild steel specifications. Consideration of future requirements by the implement interests has engaged considerable attention and it seems certain that the making of contracts, at the high prices obtaining, will be delayed as long as possible. Bar iron is moving at a rate sufficient to keep the mills comfortably filled but not crowded. Prices for high-carbon bars are ranging upward from 2.25c. as the minimum to 2.50c. We quote mill shipments, Chicago, as follows: Bar iron, 2.15c. to 2.25c.; soft steel bars, 2.539c.; hard steel bars, 2.25c. to 2.50c.; shafting, in carloads, 30 per cent off; less than carloads, 25 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c., base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 15 per cent off.

Rivets and Bolts.—Further advances are being asked for rivets and a minimum quotation of 3.25c., Pittsburgh, is announced by some makers. New discounts have also been made effective for bolts and nuts, although some current business is still being placed at the prices last quoted. We quote as follows: Carriage bolts up to ¾ x 6 in., rolled thread, 60-10; cut thread, 60-5; larger sizes, 50; machine bolts up to ¾ x 4 in.

rolled thread, with hot pressed square nuts, 60-10-5; cut thread, 60-10; larger sizes, 50-10; gimlet point coach screws, 65; hot pressed nuts, square, \$3.25 off per 100 lb.; hexagon, \$3.25 off. Structural rivets, $\frac{3}{4}$ to $1\frac{1}{4}$ in., 3.30c. to 3.40c., base, Chicago, in carload lots, boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 3.25c.; boiler rivets, 3.35c.; machine bolts up to $\frac{3}{4}$ x 4 in., 65-5; larger sizes, 65; carriage bolts up to $\frac{3}{4}$ x 6 in., 65; larger sizes, 50-15 off; hot pressed nuts, square, \$3.70, and hexagon, \$3.80 off per 100 lb.; lag screws, 65-10-5.

Wire Products.—The wire mills are making little headway against the backlog of orders which is piled up against them. With the trade buying cautiously at the high prices obtaining, the volume of business being booked is strong evidence of the large demands for consumption. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, \$2.439; wire nails, \$2.589; painted barb wire, \$2.739; galvanized barb wire, \$3.439; polished staples, \$2.739; galvanized staples, \$3.439, all Chicago.

Cast-Iron Pipe.—Awards of municipal contracts for pipe last week included 4300 tons at Cleveland to the leading interest; 1200 tons at Jackson, Mich., to James B. Clow & Son, and 1000 tons at Salt Lake City through a contractor to the American Cast Iron Pipe Company. New business is limited to small tonnages. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$32.50 to \$33; 6 in. and larger, \$29.50 to \$30, with \$1 extra for class A water pipe and gas pipe.

Old Material.—Consumers have not yet entered the market generally, although sales of heavy melting steel and stove plate in quantity are reported. It is understood that steel scrap brought only \$17, which appeared not to be an inducement sufficient to release any considerable tonnage. Steel car axles have again been in demand, presumably as a substitute for billets, and prices as high as \$26.50 are noted. Recent orders for carwheels have called for a large tonnage to be used as steel foundry scrap. Recent railroad lists have carried large items of carwheels and some of the roads are known to have several thousand tons available for sale in addition to what has been offered. Current railroad offerings of all grades include 5000 tons by the Illinois Central, 5000 tons by the Rock Island, 2400 tons by the Burlington, 1600 tons by the Great Northern, 1200 tons by the Omaha and other smaller lists. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

| Per Gross Ton | |
|--|--------------------|
| Old iron rails | \$18.00 to \$18.50 |
| Relaying rails | 19.50 to 20.50 |
| Old carwheels | 14.50 to 15.00 |
| Old steel rails, rerolling | 18.00 to 18.25 |
| Old steel rails, less than 3 ft. | 18.50 to 19.00 |
| Heavy melting steel scrap | 16.75 to 17.25 |
| Frogs, switches and guards, cut apart | 16.75 to 17.25 |
| Shoveling steel | 16.50 to 17.00 |
| Steel axle turnings | 12.25 to 12.75 |
| Per Net Ton | |
| Iron angles and splice bars | \$18.50 to \$19.00 |
| Iron arch bars and transoms | 19.25 to 19.75 |
| Steel angle bars | 15.75 to 16.00 |
| Iron car axles | 20.00 to 20.50 |
| Steel car axles | 26.00 to 26.50 |
| No. 1 railroad wrought | 16.50 to 17.00 |
| No. 2 railroad wrought | 15.00 to 15.50 |
| Cut forge | 15.00 to 15.50 |
| No. 1 busheling | 13.75 to 14.25 |
| No. 2 busheling | 10.00 to 10.25 |
| Pipes and flues | 12.00 to 12.50 |
| Steel knuckles and couplers | 15.50 to 16.00 |
| Steel springs | 16.00 to 16.50 |
| No. 1 boilers, cut to sheets and rings | 12.25 to 12.50 |
| Boiler punchings | 14.00 to 14.50 |
| Locomotive tires, smooth | 17.50 to 18.00 |
| Machine shop turnings | 8.25 to 8.50 |
| Cast borings | 7.50 to 7.75 |
| No. 1 cast scrap | 13.50 to 14.00 |
| Stove plate and light cast scrap | 11.75 to 12.00 |
| Grate bars | 11.00 to 11.25 |
| Brake shoes | 11.25 to 11.50 |
| Railroad malleable | 14.00 to 14.50 |
| Agricultural malleable | 11.75 to 12.25 |

The Federal Bridge Company, Waukesha, Wis., announces that under date of March 6 its corporate name was changed to Federal Bridge & Structural Company. After the adoption of the original name it was discovered that a company was operating under that name at Des Moines, Iowa. The new name not only avoids confusion, but more clearly indicates the nature of the company's business, which is not only bridge work, but fabrication of steel work of all classes.

Philadelphia

PHILADELPHIA, PA., March 21, 1916.

The situation in steel plates is more tense than ever, Eastern Pennsylvania mills now asking 3.50c. to 3.75c., Pittsburgh base, for deliveries five and six months away. Quotations on steel bars are difficult to obtain. Structural shapes are in heavy demand, and jobbers find it hard to keep small sections in stock. Billets are being sold to a moderate extent for delivery in the third quarter. Inquiries for 1917 deliveries of steel rails are coming out. Pig iron is slightly firmer. Several thousand tons of standard low phosphorus iron have been purchased for delivery in the first half of 1917. Contracts have been made for the delivery of several thousand tons of ferromanganese in the first half of 1917, but English makers are appending so many provisos to their contracts for future delivery that it appears doubtful if some of the material sold will ever be delivered. All sorts of contingencies are named as having a possible bearing on deliveries. Foundry coke is more active, a fair number of contracts having been booked.

Pig Iron.—The strong position of low phosphorus pig iron is indicated by the purchase in the past week of something over 5000 tons for delivery in the first half of 1917, presumably by a manufacturer who intends to insure having the iron necessary to cover a contract. The price was slightly over \$32, Philadelphia, which is the quotation also for nearby deliveries. The inquiry for low phosphorus is steady, and sellers, though well sold up, have no difficulty in booking orders. In the week a New Jersey steel company took 4000 tons of Lebanon low phosphorus. This is quoted at about \$31, furnace. Basic is quiet, no business whatever being reported. In foundry grades consumers show more interest in forward deliveries than they do in prompt, for the reason that their nearby needs are covered. The tone of the market is a little stronger, and minimum prices are more firmly held, eastern Pennsylvania producers asking \$20, furnace, for No. 2 X. A Virginia maker has advanced his price of No. 2 X to \$18.50, furnace, for delivery in the second quarter or last half, and \$19 for the last quarter alone, or \$21.25 and \$21.75, Philadelphia, respectively. The largest open inquiry before the trade specifies 4000 tons of Nos. 1 and 2 required by a Trenton manufacturer. The demand for medium-sized lots of miscellaneous grades has been steady, several consumers paying \$20.50, Philadelphia, for eastern Pennsylvania No. 2 X. In the few days that the New York, New Haven & Hartford Railroad was receiving freight Virginia furnaces managed to get several shipments started for New England. The complaint of steel foundries in this section that they are getting iron high in sulphur is not attributed to the forcing of blast furnaces but to the fact that some furnace operators have been compelled by the railroad freight embargoes to use whatever coke they could get, and it has not always been of desirable quality. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

| | |
|------------------------------|--------------------|
| Eastern Pa., No. 2 X foundry | \$20.00 to \$20.50 |
| Eastern Pa., No. 2 plain | 19.75 to 20.25 |
| Virginia, No. 2 X foundry | 20.75 |
| Virginia, No. 2 plain | 20.25 |
| Gray forge | 19.00 to 19.50 |
| Basic | 19.50 to 20.00 |
| Standard low phosphorus | 32.00 |

Ferroalloys.—In the past few days contracts for several thousand tons of 80 per cent ferromanganese have been placed for delivery in the first half of 1917, at \$175, seaboard. Still more orders are pending, awaiting cabled acceptance by the English makers. The possibility of the non-delivery of at least a part of the material bought for future delivery is more than suggested by the following terms on which the English makers are accepting the business, and which were received by cable last week: "Deliveries may be suspended during any contingencies beyond control of sellers, including strikes, lockouts, labor troubles, fire, war, short supplies of fuel or raw material, accidents or short supplies of tools, plant machinery or manufactured product, rise by more than 25 per cent in rates of freight from India to United Kingdom or from United

Kingdom to United States of America, or other causes preventing or hindering the manufacture or delivery of the article at the works or to the buyers in the United States of America." A western Pennsylvania furnace is making ferromanganese running 50 to 60 per cent in manganese, using a mixture of Brazilian and domestic ores. For this product \$5 per unit is quoted, and \$5.25 per unit has been paid in a case of a resale. Spot standard ferromanganese is quoted at \$400 per ton. A local interest which is prominent in the importation of Brazilian manganese ore has purchased a furnace at Sheridan, Pa., and is completing plans for the production of 80 per cent ferromanganese. The custom house reported the arrival at this port last week of 425 tons of English ferromanganese. Bessemer ferrosilicon is unchanged at \$35.44, Philadelphia, and 50 per cent at \$83 to \$85, Pittsburgh, according to quantity. Neither has been in exceptional demand the past week.

Iron Ore.—The only arrival of foreign ore reported in the week ended March 18 consisted of 9464 tons from Sweden.

Plates.—Quotations by eastern Pennsylvania mills continue to show considerable variance. One large maker has an official price of 3.75c., Pittsburgh base, equal to 3.905c., Philadelphia, but says he has no difficulty in getting 4c., deliveries to be made in five or six months. Earlier deliveries can be made on universal rolled plates. Further small lots have brought 5c., Pittsburgh. Another maker is not seeking business, but intimates that 3.659c. (3.50c., Pittsburgh) would be accepted on a desirable order. A third maker quotes on the 3.75c., Pittsburgh, basis. The demand is heavy from locomotive, ship and bridge builders, as well as from the railroads. Inquiry is out for the material for five to seven ships.

Bars.—The nominal quotation for steel bars continues at 2.509c., Philadelphia, but some of the leading makers say they are out of the market at any price and for any delivery. Concrete reinforcing bars are in heavy demand because of the increased amount of concrete construction work now under way. Jobbers in such bars are understood to have been well stocked when the demand developed. At least one maker of steel shrapnel rounds is considering a plan to roll discarded material into bars. Iron bars are unchanged, and very strong at 2.559c., Philadelphia, for carloads.

Structural Material.—Eastern Pennsylvania mills quote a minimum price of 2.659c., Philadelphia, to regular customers, and 3.159c. to others. Light sections are in especially heavy demand and jobbers find it impossible to keep them in stock. The railroads realize that they have overstayed the market, and are quietly feeling around for material. The general contract for the Beneficial Saving Fund Building, Philadelphia, requiring about 200 tons, has been awarded to Doyle & Co., this city. A department store in Baltimore, Md., calling for 700 tons, has been placed.

Billets.—To a moderate extent an eastern Pennsylvania maker has booked contracts for third quarter. This maker quotes open-hearth rerolling steel at \$50 to \$55, and forging billets at \$65 to \$70. The demand is strong.

Rails.—The Boston & Maine Railroad is inquiring for 15,000 to 20,000 tons, and the Missouri, Kansas & Texas for 15,000 tons, both for 1917 delivery. Interest on the part of the trolley lines is below normal, one reason being that their earnings have been seriously impaired by jitney buses in many cities.

Sheets.—No. 10 blue annealed sheets are quoted at 3.75c., Pittsburgh, or 3.905c., Philadelphia.

Coke.—Both spot and contract foundry coke have been fairly active. Spot foundry is quoted at \$4 to \$4.50 per net ton at oven, and contract at \$3.50 to \$3.75. Spot furnace is quoted at about \$3.75 per net ton at oven and contract at \$3 to \$3.50. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

Old Material.—The market is strong, with dealers disposed to hold for higher prices. The steel mills have not yet shown any great need of material. Quotations for delivery in buyers' yards in this district, covering

eastern Pennsylvania, and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

| | |
|--|--------------------|
| No. 1 heavy melting steel..... | \$17.00 to \$17.50 |
| Old steel rails, rerolling..... | 19.00 to 20.00 |
| Low phos. heavy melting steel scrap..... | 22.50 to 23.25 |
| Old steel axles..... | 25.00 to 26.00 |
| Old iron axles..... | 27.00 to 28.00 |
| Old iron rails..... | 20.00 to 20.50 |
| Old carwheels..... | 16.50 to 17.00 |
| No. 1 railroad wrought..... | 22.00 to 22.50 |
| Wrought-iron pipe..... | 15.25 to 15.75 |
| No. 1 forge fire..... | 15.00 to 15.50 |
| Bundled sheets..... | 15.00 to 15.50 |
| No. 2 busheling..... | 11.00 to 11.50 |
| Machine shop turnings..... | 10.50 to 11.00 |
| Cast borings..... | 11.00 to 11.50 |
| No. 1 cast..... | 17.00 to 18.00 |
| Grate bars, railroad..... | 13.50 to 14.00 |
| Stove plate..... | 13.50 to 14.00 |
| Railroad malleable..... | 15.00 to 15.50 |

Cincinnati

CINCINNATI, OHIO, March 22, 1916.—(By Wire.)

Pig Iron.—A perceptible decrease in business is reported in the past few days. Michigan and Indiana consumers placed a few good-sized orders last week, included in which was one for 2000 tons of malleable to go to central Indiana. Several sales of mixed Northern and Southern foundry iron were also made in the same territory. The Ohio silvery irons were a little more active, and while \$27 at furnace is the open quotation this price has been shaded on several late deals. The Louisville & Nashville Railroad purchased approximately 700 tons of Southern iron for last half shipment, reported to be at \$15.50, Birmingham basis. Prompt Southern iron is still available at \$15, Birmingham, although this is lower than what the furnace interests are said to be willing to accept. Last half quotations are unchanged around \$15.50 to \$16. Northern furnaces are holding firm at \$19, Iron-ton, for shipment over the remainder of the year, but some resale iron was sold last week as low as \$18.50 for nearby delivery. Northern malleable is very firm and \$19, furnace, is strictly adhered to. A local melter is inquiring for 6000 tons of mixed Northern and Southern foundry grades, 2000 tons of which is for this year's shipment and the remainder for first and second quarters next year. Other smaller inquiries for foundry iron for shipment next year have been received by local sales agencies, but producers are not willing to open their books yet for that delivery. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Iron-ton, we quote, f.o.b. Cincinnati, as follows:

| | |
|--|--------------------|
| Southern coke, No. 1 f'dry and 1 soft..... | \$18.40 to \$18.90 |
| Southern coke, No. 2 f'dry and 2 soft..... | 17.90 to 18.40 |
| Southern coke, No. 3 foundry..... | 17.40 to 17.90 |
| Southern No. 4 foundry..... | 16.90 to 17.40 |
| Southern gray forge..... | 16.40 to 16.90 |
| Ohio silvery, 8 per cent silicon..... | 28.26 to 28.76 |
| Southern Ohio coke, No. 1..... | 20.76 to 21.26 |
| Southern Ohio coke, No. 2..... | 19.76 to 20.26 |
| Southern Ohio coke, No. 3..... | 19.26 to 19.76 |
| Southern Ohio malleable Bessemer..... | 19.76 to 20.26 |
| Basic, Northern..... | 19.76 to 20.26 |
| Lake Superior charcoal..... | 21.20 to 22.20 |
| Standard Southern carwheel..... | 25.40 to 25.90 |

(By Mail)

Coke.—It is still quite difficult to name prompt shipment prices on either furnace or foundry coke, especially Connellsville. Contract Connellsville furnace coke ranges from \$2.50 to \$3 per net ton at oven and contract foundry coke is around \$3.50. Wise County producers are holding out for approximately 25c. per ton more and New River operators make about a 50c. advance. Consumers of 48-hr. coke are taking more interest in the situation but no contracts of note have been made in this territory in the past few days. The foundries are covering for future requirements and the tonnage booked for shipment between July 1 this year and July 1, 1917, is said to be quite satisfactory.

Finished Material.—Warehouse stocks are diminishing and jobbers who have contracted ahead have resold a fairly large percentage of material due them. Prices have advanced and steel bars from stock to-day are quoted at 3.20c., base; twisted steel bars, 3.35c.; plates, 3.50c.; No. 10 blue annealed sheets, 3.35c.; rounds and squares, 2 in. and over, 3.75c.; No. 28 galvanized sheets,

5.20c. The nearby mills are quoting No. 28 galvanized sheets at 5.15c., Cincinnati, or Newport, Ky., and No. 28 black, 3.05c. Wire nails are quoted by local jobbers at \$2.55 per keg, base, and barb wire at \$3.45 per 100 lb.

Old Material.—Optimistic reports are made by different dealers who are now shipping out scrap almost as fast as received. Prices are quite firm, but the only advance noted is a small one on heavy melting steel scrap and another on locomotive tires. The minimum prices given below represent what dealers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices, f.o.b. at yards:

| Per Gross Ton | |
|------------------------------------|--------------------|
| Bundled sheet scrap..... | \$11.00 to \$11.50 |
| Old iron rails..... | 15.75 to 16.25 |
| Relaying rails, 50 lb. and up..... | 22.00 to 22.50 |
| Revolving steel rails..... | 14.50 to 15.50 |
| Heavy melting steel scrap..... | 15.25 to 15.75 |
| Steel rails for melting..... | 14.25 to 14.75 |

| Per Net Ton | |
|---------------------------------------|--------------------|
| No. 1 railroad wrought..... | \$13.75 to \$14.25 |
| Cast borings..... | 7.00 to 7.50 |
| Steel turnings..... | 6.75 to 7.25 |
| Railroad cast scrap..... | 12.00 to 12.25 |
| No. 1 machinery scrap..... | 13.75 to 14.25 |
| Burnt scrap..... | 9.00 to 9.50 |
| Iron axles..... | 19.50 to 20.00 |
| Locomotive tires (smooth inside)..... | 15.00 to 15.50 |
| Pipes and flues..... | 10.50 to 11.00 |
| Malleable and steel scrap..... | 11.00 to 11.50 |
| Railroad tank and sheet scrap..... | 9.00 to 9.50 |

Cleveland

CLEVELAND, OHIO, March 21, 1916.

Iron Ore.—Because of the severe winter weather during the past few days shippers and vessel men have given up the hope of opening the season of navigation on April 1. It is probable that ore shipments will not start before about the middle of the month. Had the weather been mild it was the intention to break the ice at Escanaba and open a channel for the boats, but the ice is so solid that this is not regarded as practicable. Shipments from the docks are fairly heavy, although some consumers are not getting their ore as fast as desired, because of the car shortage. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, \$4.45; Mesaba Bessemer, \$4.20; Old range non-Bessemer, \$3.70; Mesaba non-Bessemer, \$3.55.

Pig Iron.—The demand for foundry iron continues fairly active in lots up to 1000 tons for the last half delivery. Some inquiry has developed for the first half of next year, but local furnaces and selling agencies are refusing to quote for that delivery. The Valley price on foundry iron has stiffened up to \$18.75 to \$19 for No. 2 and little if any iron can be had at \$18.50. Cleveland furnaces continue to quote \$18.50 for out of town shipment. Bessemer iron is firm at \$21, Valley furnace. Small lot sales are reported at that price for early shipment and at \$21.50 for the third quarter delivery. One Cleveland agency reports sales so far in March considerably in excess of 100,000 tons. Southern iron is rather quiet, although some small lot sales are reported. Southern iron is quoted at \$15.50 for second quarter, and iron can probably be had at this price for last half, although most producers are asking \$16 for that delivery. Ferromanganese is being offered at \$425 for prompt shipment. We quote, delivered Cleveland, as follows:

| | |
|---|------------------|
| Bessemer..... | \$21.95 |
| Basic..... | 19.00 |
| Northern No. 2 foundry..... | 19.00 |
| Southern No. 2 foundry..... | \$19.50 to 20.00 |
| Gray forge..... | 18.45 |
| Jackson Co. silvery 8 per cent silicon..... | 28.62 |
| Standard low phos., Valley furnace..... | 32.00 |

Coke.—Some foundry coke contracts are being placed at \$3.50 per net ton at oven for a full year from July 1, and \$3.75 to \$4 for the last half. For prompt shipment Connellsville foundry coke is selling at \$4 to \$5. Furnace coke is inactive, the price for prompt shipment being about \$3.50.

Finished Iron and Steel.—Specifications and new demand are on a large scale, the pressure to secure steel is greater than ever and prices on early shipments continue to advance. The demand on warehouses is very

heavy and warehouse stocks are being depleted. The anxiety to have steel when needed is illustrated by the purchase of 350 tons of bars, plates and shapes from warehouse by a manufacturer who will place the material in stock to be sure he will have it when needed late in the year. The Carnegie Steel Company, which recently opened its books for rails for the first half of 1917 delivery, has taken 15,000 tons from the Wheeling & Lake Erie Railroad and 2500 tons from the Nickel Plate for the spring of 1917 delivery. Another inquiry is pending for 1100 tons for 1916 delivery. Many inquiries are coming out for protection on contracts, particularly for structural material. These include 8000 or 10,000 tons of steel for factory buildings and bridges. Protection has been given on some of these inquiries at 2.45c. for steel bars and structural material and 2.75c. for plates. New structural work that has developed locally includes a Masonic Temple requiring about 1500 tons. The terminal freight depot and other work in connection with the terminal facilities of the Cleveland & Youngstown Railroad will require 20,000 to 25,000 tons of steel. It is expected this will be placed this spring. Inquiries are pending for 50 locomotives for the Pennsylvania lines and for 30 locomotives for the Chicago, Burlington & Quincy Railroad. The Pacific Bridge Company, Portland, Ore., has taken three concrete bridges for Dayton, Ohio, that will require several hundred tons of reinforcing bars. The McClintic-Marshall Company has taken 400 tons for a factory building for the General Electric Company at Erie, Pa. Plates are in heavy demand and Eastern mills have advanced their prices to from 3.75c. to 4c. at mill. Local mills quote plates at 3.25c. to 3.50c. The demand for semi-finished steel is heavy and mills are cleaning up their odds and ends in billets, ordinarily classed as scrap, at \$40 to \$42 per ton. A Cleveland mill has made sales of forging billets at \$62, Cleveland, and rerolling open-hearth billets at \$46. We note the sale of 300 tons of forging billets at \$65, Eastern mills, for delivery in this market. Hard steel bars have been advanced to 2.50c., Pittsburgh; iron bars are unchanged at about 2.35c., Cleveland. The demand for blue annealed sheets is very heavy. Several mills are sold up and out of the market. Mills are also well filled with orders for black sheets. We quote sheets at 2.75c. to 2.85c., Ohio mill, for No. 28 black; 2.90c. to 3c. for No. 10 blue annealed, and 4.90c. to 5.15c. for No. 28 galvanized. These prices, however, are for future delivery and some mills are getting as much as \$5 per ton higher on black and blue annealed sheets for early shipment. Warehouse prices are unchanged at 3.25c. for steel bars and structural material, 3.65c. for plates, 3.50c. for blue annealed sheets, and 3.20c. for iron bars.

Cast-Iron Pipe.—The United States Cast Iron Pipe & Foundry Company was low bidder on 4300 tons of cast-iron pipe for the Cleveland water works and will probably be awarded the contract, although because of the high prices the amount of pipe that will be purchased will probably have to be cut down somewhat. The low bid was \$30.50 for 6-in. pipe and \$30 for 30-in. pipe.

Bolts, Nuts and Rivets.—Bolt and nut makers have made a further advance in prices amounting to from 10 to 15 per cent. With the new discounts there is no differential between the price of square and hexagon nuts. The current demand continues heavy and some contracts are being closed, but only for delivery until July 1. With strong demand for rivets prices are maintained at the advance noted last week. We quote at 3.15c., Pittsburgh, for structural and 3.25c. for boiler rivets in carload lots for prompt shipment. Bolt and nut discounts are as follows:

Common carriage bolts, $\frac{3}{4}$ x 6 in., smaller or shorter, rolled thread, 60 and 10; cut thread, 60 and 5; larger or longer, 50; machine bolts with h. p. nuts, $\frac{3}{4}$ x 4 in., smaller and shorter, rolled thread, 60, 10 and 5; cut thread, 60 and 10; larger and longer, 50 and 10; lag bolts, gimlet or cone point, 65; square h. p. nuts, blank or tapped, \$3.25 off the list; hexagon, h. p. nuts, blank or tapped, \$3.25 off; c. p. c. and t. square nuts, blank or tapped, \$3 off; hexagon nuts, all sizes, \$3.50 off; cold pressed semi-finished hexagon nuts, all sizes, 70, 10 and 10 off.

Old Material.—The market is very firm in spite of the fact that there is not a great deal of activity and prices have been marked up 50c. a ton on several

grades, including heavy melting steel scrap. Most mills have bought heavily and will not need additional scrap for some time and these are out of the market, although they are willing to take on scrap that is offered at attractive prices. However, little scrap is being offered at a bargain, producers generally holding out for higher prices. In fact, dealers who have sold short are having some trouble in covering. A Cleveland mill has taken 1000 tons of heavy melting steel scrap at \$18 and cast scrap has sold at \$14.90 in this market. Borings are slightly more active and firmer, some being sold as high as \$9.50 per net ton. The market in Youngstown is dull. We quote, f.o.b. Cleveland, as follows:

| Per Gross Ton | |
|---------------------------------------|--------------------|
| Old steel rails | \$17.50 to \$18.00 |
| Old iron rails | 19.00 |
| Steel car axles | 25.00 to 26.00 |
| Heavy melting steel | 17.50 to 18.00 |
| Old carwheels | 14.50 to 15.00 |
| Relaying rails, 50 lb. and over | 22.50 |
| Agricultural malleable | 14.25 to 14.75 |
| Railroad malleable | 17.00 to 17.50 |
| Steel axle turnings | 13.25 to 13.50 |
| Light bundled sheet scrap | 14.00 to 14.25 |
| Per Net Ton | |
| Iron car axles | \$23.00 to \$24.00 |
| Cast borings | 9.00 to 9.50 |
| Iron and steel turnings and drillings | 8.00 to 8.25 |
| No. 1 busheling | 14.50 to 14.75 |
| No. 1 railroad wrought | 18.50 to 19.00 |
| No. 1 cast | 14.50 to 15.00 |
| Railroad grate bars | 12.50 to 13.00 |
| Stove plate | 12.00 to 12.25 |

Birmingham

BIRMINGHAM, ALA., March 20, 1916.

Pig Iron.—Following the heavy buying movement, which from Feb. 1 to March 15 enabled Alabama makers to book an aggregate of 300,000 tons, several makers have instructed their sales agents to submit all inquiries to headquarters. The Alabama Company declined to book 6000 tons of special and foundry irons in order not to go beyond a 75-per-cent capacity on order books. The Woodward Company is operating along somewhat the same lines. No absolute withdrawals from the market have been made, but makers are holding their reserves for the protection of regular customers. Warrant iron is stronger and is going only fractionally under makers' prices. The minimum of \$15 for spot is not always available, two interests having advanced to \$15.50. The minimum of \$15.50 for second half has been advanced by two interests to \$16. In the case of one of the latter, it is on ironclad instructions from headquarters. The leading interest is in line with the higher prices. It entered the market on the \$15.50 basis, sold what it cared to sell at that figure, and then marked up. Sales in the third week of the month dropped off considerably, but the inquiry is such as to take care of a maximum make. The second Vanderbilt stack of the Woodward Company is to be repaired, which will take about three months. It will be ready for blast about the same time as the new stack of the Sloss-Sheffield, namely, July 1. The latter company is making regular weekly shipments of about 1600 tons via barge line to Paducah and Metropolis for St. Louis, Chicago, and the Northwest. The Ensley and Fairfield mills are shipping rods and wire North to fill orders taken by overcrowded Northern mills. Rail orders are such as to justify large operations for an indefinite period. The export business is heavy. The first run in the electric steel furnace of the Alabama Power Company was made the past week and pronounced satisfactory. Alabama car service figures for February were 77,400 cars, as compared with 77,346 in January and 52,442 in February, 1915. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

| | |
|------------------------|--------------------|
| No. 1 foundry and soft | \$15.50 to \$16.00 |
| No. 2 foundry and soft | 15.00 to 15.50 |
| No. 3 foundry | 14.50 to 15.00 |
| No. 4 foundry | 14.25 to 14.75 |
| Gray forge | 14.00 to 14.50 |
| Basic | 15.00 to 15.50 |
| Charcoal | 23.00 to 23.50 |

Cast-Iron Pipe.—Conditions in the water and gas pipe market continue satisfactory. Orders from South America are reported as coming in with some degree of regularity, following the trip of J. R. McWane, of the

American Cast Iron Pipe Company. Shapes and sizes suited to South American wants are to be manufactured. An order for 5000 tons for Montevideo is reported. Sanitary pipe shops are not yet on full time. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$28; 6-in. and upward, \$25, with \$1 added for gas pipe and special lengths. One interest, the smallest, quotes \$27 and \$24. No immediate plant improvements are contemplated in the proposition of the National Cast Iron Pipe Company to increase its capital stock from \$200,000 to \$350,000.

Coal and Coke.—The coke supply is less than the demand, even at the new minimum of \$4 per net ton for beehive foundry, f.o.b. oven. Shipments to Mexico and the Pacific coast are features of the trade. The scarcity of cars for long-distance shipment hampers movements. The effort to bring all available beehive ovens into use continues.

Old Material.—Dealers report a fair business and are disposed to take on stocks in anticipation of the working off of low-priced pig iron, which is fast disappearing. The dealers are not being offered more than they desire. We quote, per gross ton, f.o.b. dealers' yards, as follows:

| | |
|------------------------|--------------------|
| Old iron axles | \$13.00 to \$13.50 |
| Old steel axles | 13.00 to 13.50 |
| No. 1 railroad wrought | 10.50 to 11.00 |
| No. 2 railroad wrought | 9.00 to 9.50 |
| No. 1 country wrought | 9.00 to 9.50 |
| No. 1 machinery cast | 10.00 to 10.50 |
| No. 1 steel scrap | 10.00 to 10.25 |
| Tram carwheels | 10.00 to 10.25 |
| Stove plate | 8.50 to 9.00 |

St. Louis

ST. LOUIS, MO., March 20, 1916.

Pig Iron.—Transactions of the week were practically all of 300 tons and below and altogether for last half delivery. One sale of No. 2 Northern of 500 tons was reported, and there is one inquiry outstanding for 1000 tons of No. 2 Northern. The aggregate sales of the week will probably run about 5000 tons. One interesting feature was the placing of a considerable tonnage, in total, of ferromanganese for first half of 1917 at \$175, New Orleans.

Old Material.—The market is strong with an advancing tendency, and dealers are holding firmly to quotations. Offerings of railroads are being taken at good prices. The only lists out during the week were one of 2000 tons from the Great Northern and one of 3300 tons from the Chicago, Burlington & Quincy. Relaying rails are scarce and the prices accordingly very strong. We quote dealers' prices f.o.b. St. Louis industrial district, customers' works, as follows:

| Per Gross Ton | |
|---|--------------------|
| Old iron rails | \$17.00 to \$17.50 |
| Old steel rails, rerolling | 17.00 to 17.50 |
| Old steel rails, less than 3 ft. | 16.75 to 17.25 |
| Relaying rails, standard section, subject to inspection | 22.00 to 23.00 |
| Old carwheels | 13.75 to 14.25 |
| No. 1 railroad heavy melting steel scrap | 16.00 to 16.50 |
| Heavy shoveling steel | 14.50 to 15.00 |
| Frogs, switches and guards cut apart | 16.00 to 16.50 |
| Bundled sheet scrap | 11.00 to 11.50 |

| Per Net Ton | |
|---|--------------------|
| Iron angle bars | \$16.50 to \$17.00 |
| Steel angle bars | 14.50 to 15.00 |
| Iron car axles | 21.50 to 22.00 |
| Steel car axles | 23.50 to 24.00 |
| Wrought arch bars and transoms | 19.00 to 19.50 |
| No. 1 railroad wrought | 15.75 to 16.25 |
| No. 2 railroad wrought | 15.25 to 15.75 |
| Railroad springs | 15.50 to 16.00 |
| Steel couplers and knuckles | 15.00 to 15.50 |
| Locomotive tires, 42 in. and over smooth inside | 17.00 to 17.50 |
| No. 1 dealers' forge | 13.00 to 13.50 |
| Mixed borings | 9.00 to 9.50 |
| No. 1 busheling | 13.50 to 14.00 |
| No. 1 boilers, cut to sheets and rings | 11.00 to 11.50 |
| No. 1 railroad cast scrap | 13.00 to 13.50 |
| Stove plate and light cast scrap | 10.00 to 10.50 |
| Railroad malleable | 12.00 to 12.50 |
| Agricultural malleable | 11.00 to 11.50 |
| Pipes and flues | 11.00 to 11.50 |
| Railroad sheet and tank scrap | 10.00 to 10.50 |
| Railroad grate bars | 10.00 to 10.50 |
| Machine shop turnings | 10.50 to 11.00 |

Finished Iron and Steel.—A broadening inquiry is reported. Demand is being turned more and more to the warehouses. Receivership roads of this territory

are known to be making every effort to get their affairs into such shape that they can make early appearance in the market. We quote for stock out of warehouse as follows: Soft steel bars, 3.15c.; iron bars, 3.10c.; structural material, 3.15c.; tank plates, 3.75c.; No. 10 blue annealed sheets, 3.30c.; No. 28 black sheets, cold rolled, one pass, 3.20c.; No. 28 galvanized sheets, black sheet gage, 5.60c.

Coke.—Cases have been reported of sales in carload lots at \$5, Connellsville, and \$5, Virginia, per net ton at oven, to meet urgent needs. By-product coke continues to hold itself steady with the oven quotation from Connellsville.

New York

NEW YORK, March 22, 1916.

Pig Iron.—New England and New York State have furnished the greater part of the local business of the past ten days. Buying by Connecticut malleable interests has amounted in one case to 8000 tons, including one lot of 6000 tons, with some low phosphorus iron. In another case an inquiry is up for 6000 tons of malleable. Two New England textile machinery foundries have been in the market, one buying 4000 tons of Buffalo iron. In another case an inquiry has come up in Massachusetts for 4000 tons of No. 2 X for second half delivery. Virginia iron figured to only a small extent, comparatively, in the recent purchases in New England. In Rhode Island a round lot of basic has been under inquiry in the past week. The leading Virginia seller has raised its price for second quarter and second half delivery to \$18.50 at furnace for No. 2 X, for fourth quarter alone \$19 is asked. The embargo on coke and pig iron in New England is effective again, after having been suspended for a few days. Buffalo prices are not uniform. Some sales of No. 2 X have been made at \$19.50 at furnace and as high as \$20 was done on a 1000-ton lot. But it is quite certain that \$19 Buffalo can be done on No. 2 X and lower prices have been made within the week. For a Newark soil pipe plant 1000 tons has been bought and the same buyer is believed to be still in the market. In New Jersey an inquiry for 1000 tons is pending at Elizabethport and at Newark one buyer has taken 500 tons. A crucible steel works in New Jersey has taken 1500 tons of Bessemer. Low phosphorus iron has been in considerable demand and a sale of 5000 tons reported in New Jersey, with Canadian buyers also negotiating. Some Bessemer iron for export was taken in the Schuylkill Valley by an interest which is a maker of low phosphorus iron. We quote at tidewater as follows for early delivery. No. 1 foundry, \$20.75 to \$21.25; No. 2 X, \$20.50 to \$20.75; No. 2 plain, \$20 to \$20.50; Southern iron at tidewater, \$20.75 to \$21 for No. 1 and \$20.25 to \$20.50 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Spot ferromanganese, 80 per cent, is extremely scarce, but about 15,000 tons for delivery in the first half of 1917 has been sold this month by British interests at \$175, seaboard, 5000 tons of this in the past week. At least two representatives of British producers have been making such contracts. Spot material has sold as high as \$448 and almost any price can be obtained for any lots available, so urgent are the immediate needs of some consumers. Ferromanganese, containing 50 to 60 per cent of manganese, is selling at \$5 per unit at furnace and some resale lots of this have gone at \$5.50. Alloy of 30 and 35 per cent manganese has sold from \$110 to \$125 per ton. Spiegeleisen, 20 per cent, is quoted at \$60 furnace, but only limited quantities are available, and it is understood that spot and resale lots of this have sold at over \$100. Demand for all grades of manganese alloys is urgent, but receipts from England are better than had been anticipated, those for February, about 7000 tons, exceeding any month except July, 1915, in the past fourteen months. While domestic production is not as high as it has been, the prospects of increasing it are good if several reported projects bear fruit. It is stated, however, that England and France have very recently secured control of all Brazilian manganese ore not under contract. This has not been confirmed and it is not

known to what extent contracts protect consumers in this country. Ferrosilicon, 50 per cent, is active and strong, but deliveries on contracts are better in some cases than they have been. The last quotation for contract was \$83 to \$85, Pittsburgh, and an advance is not improbable. Spot material is considerably higher and the needs of some consumers are urgent.

Structural Material.—Contracting for fabricated structures goes on apace and inquiry is exceptionally good. While considerable of the going work covers plain material moving at 1.80c., Pittsburgh, say, under tonnage contracts, with cases as low as 1.50c., no small part has had to be figured at going prices. So far as new projects are concerned the higher steel prices obtain, with store prices for the more urgent jobs. Meanwhile speculative building work is substantially absent, to await lower prices at some future date. The additional new work which has appeared includes 1700 tons for a loft for P. W. Rouss, Greene Street; 300 tons for the New York Shipbuilding Company; 700 tons for reinforcing the Second and Third Avenue lines of the Interborough's elevated lines; 400 tons for a custom house at Wilmington, Del.; 200 tons for the Baltimore & Ohio at Chicago; 300 tons for the Ingersoll-Rand Company, Phillipsburg, N. J.; 800 tons for bridge work for the Atlantic Coast Line at Richmond, Va., and 500 tons for subsurface work for the New York Central, Vanderbilt Avenue and Depew Place. The new hotel opposite the Pennsylvania Station will take 15,000 tons. Over 13,000 tons have been awarded, as follows: The Levering & Garrigues Company has 1000 tons for the Merchants Refrigerating Company, Tenth Avenue and Sixteenth Street; 700 tons of column cores for the Wyllis-Overland Company, West Fiftieth Street; 450 tons for the Wanamaker garage and warehouse, Philadelphia, and 200 tons for a building at Twenty-third and Walnut Streets, Philadelphia. The Pennsylvania Lines West has placed 2150 tons for track elevation work in Chicago, distributed among the Mt. Vernon Bridge Works, the Riter-Conley Mfg. Company and the McClintic-Marshall Company; the Baltimore & Ohio has awarded 1400 tons in five spans to the King Bridge Company, and it is expected that the Virginia Bridge & Iron Company will get 2400 tons for the Norfolk & Western piers. The McClintic-Marshall Company has also taken 4000 tons for the Donner Steel Company and 600 tons for a hotel at Fairmount, W. Va., while the Virginia Bridge & Iron Company has 800 tons for the National Festival Chorus, Black Mountain, N. C. The Passaic Structural Steel Company has closed for 700 tons for a loft on West Thirty-ninth Street, and A. V. Haley, Syracuse, for 400 tons for the Rosenbloom Arcade, that city. We quote plain material from mill at 2.35c., Pittsburgh, or 2.519c., New York, for an attractive tonnage in some weeks, but a range to 3c., New York, depending on the delivery and the size of the order, while store prices appear to be 3.10c., New York, as a minimum.

Iron and Steel Bars.—Bar iron is strong with considerable buying at prices above the minimum and deliveries if anything slightly more extended, say 45 to 60 days. Bar products are stronger, bolts and nuts being up about 10 per cent, and one maker at least asking \$5 advance on the larger rivets for second quarter contracts. Shafting is now selling at 25 and 20 per cent, depending on whether for carload lots or less. Steel bars are scarce and nominally at 2.919c., New York, and higher, according to the delivery, while iron bars for mill shipment are quoted at 2.569c. to 2.669c., New York. Store prices are minimum at about 3.10c., New York. Small lots of large rounds for munition purposes get takers among the mills from time to time with 4c., Pittsburgh, and perhaps higher for prompt shipment.

Steel Plates.—Most of the new business is going at 3.75c., Pittsburgh, with deliveries in a number of weeks, but for immediate shipment or delivery in days rather than weeks and for sizes not obtainable from warehouses, as high as 5.25c., Pittsburgh, has been done. No sales below 3.50c., Pittsburgh, have been noted for anything approaching nearby delivery and accordingly we quote for prompt plates 3.669c., New York, and for

future shipment 2.919c., New York, and for plates from store 4c., New York. Some 1500 tons, requiring flanging, is under consideration, and a few other round lots are under price negotiation. Export inquiries get little or no consideration. Some 7250 tons for a St. Louis pipe line brought prices beyond appropriation, and this work is for the time being in the indefinite class like the round lot for Jersey City, which found prices too high. Car buying is for the moment quiet, but here also have high costs again been advanced as reason for postponement, the Burlington withdrawing 1000 box cars, though it plans to keep to the intention of buying 500 automobile cars.

Cast-Iron Pipe.—The city of Cambridge, Mass., will open bids March 25 on 400 tons of 4 to 6 in., and Boston, March 27, on 140 tons of 8 and 12 in., high pressure. The Standard Cast Iron Pipe & Foundry Company was low bidder, at \$29.98 per net ton, on 1230 tons of 4 to 20 in. pipe to be delivered at Brooklyn for the Department of Water Supply, Gas and Electricity of the city of New York. A great deal of private buying is in progress. Carload lots of 6-in., class B and heavier, are unchanged at \$29.50 per net ton, tidewater, class A and gas pipe taking an extra of \$1 per ton.

Old Material.—All embargoes being now lifted in eastern Pennsylvania, and the movement into that section being again unhampered, the market on heavy melting steel and rolling-mill stock is somewhat better. Relaying rails are in strong demand. Inquiries for export continue to be received but very few brokers are in position to take advantage of the opportunity for business thus offered. Through an oversight last week the distinction between prices of No. 1 heavy melting steel scrap for shipment to Pittsburgh and New York yard steel scrap, eastern Pennsylvania specifications, was not stated. The quotations on yard steel scrap which should then have been given were \$14.75 to \$15.25. Brokers are paying about as follows to local dealers and producers, per gross ton, New York:

| | |
|------------------------------------|--------------------|
| No. 1 heavy melting steel scrap | \$15.75 to \$16.00 |
| Yard heavy steel (east. Pa. spec.) | 15.50 to 15.75 |
| Relaying rails | 23.50 |
| Rerolling rails | 16.50 to 17.00 |
| Iron car axles | 25.50 to 26.00 |
| Steel car axles | 26.00 to 26.50 |
| No. 1 railroad wrought | 20.75 to 21.25 |
| Wrought-iron track scrap | 18.00 to 18.50 |
| No. 1 yard wrought, long | 16.50 to 17.00 |
| No. 1 yard wrought, short | 15.50 to 16.00 |
| Light iron | 7.50 to 8.00 |
| Cast borings (clean) | 8.75 to 9.00 |
| Mixed borings and turnings | 8.00 to 8.25 |
| Wrought pipe | 13.00 to 13.25 |
| Old carwheels | 14.50 to 15.00 |
| Malleable cast (railroad) | 12.75 to 13.25 |

Foundries continue to purchase freely, but seldom take large quantities. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

| | |
|------------------------|--------------------|
| No. 1 cast (machinery) | \$18.00 to \$18.50 |
| No. 2 cast (heavy) | 16.00 to 16.50 |
| Stove plate | 12.00 to 12.50 |
| Locomotive grate bars | 12.00 to 12.50 |

The Alaska Engineering Commission, through its purchasing department, located at Bell Street Wharf, Seattle, Wash., has recently closed a number of deals for lumber, tugs and equipment of all kinds for use in connection with the Government railroad work under construction in Alaska. Included in the purchases were three tugs, aggregating \$54,500; two large gasoline motors, and a track pile driver costing \$13,000. The commission's shipments to Alaska will shortly begin to add heavily to the coastwise freight movement.

The Asbestos Protected Metal Company, First National Bank Building, Pittsburgh, some time ago put on the market what is known as the Pittsburgh paving joint, which is a flexible joint for concrete, brick, stone and block roadway and sidewalks. It is made of an asphaltic compound of great flexibility. It is said that, withstanding exposure in the hottest weather, because of its high melting point, which is 260 deg. Fahr., the company is having a large demand for it.

British Steel Market

Pig-Iron Production in 1915—Sales of American Billets

(By Cable)

LONDON, ENGLAND, March 22, 1916.

The pig-iron market is quiet but export demand is good, especially for Scandinavia. General export business is only possible, however, under permits. British pig-iron production in 1915 was 8,793,659 gross tons, comprising 3,564,276 tons of hematite iron, 2,272,684 tons of basic iron and 1,573,575 tons of foundry iron. (The 1914 output was 8,923,773 gross tons.) Official prices for marked bars are £14 15s., and for unmarked bars, £13 5s.

American 4-in. billets have sold at £12 10s. c.i.f. for April to June delivery, and also for \$55, c.i.f., Liverpool, for May-June delivery and \$65, c.i.f. Glasgow, while high carbon billets have gone at £13 15s., c.i.f. Glasgow. Quotations, partly nominal, of some materials are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 30s. 6d., against 29s. 6d. to 30s., last week.
Cleveland pig-iron warrants, 86s. 6d., against 85s. 6d., last week.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £19 15s., against £20, nominal, last week.
Steel ship plates, Scotch, delivered local yards, £13 10s., compared with £13 5s. a week ago.
Steel rails, export, f.o.b. works, port, £11.
Hematite pig iron, f.o.b. Tees, about 135s.
Sheet bars (Welsh) delivered at works in Swansea Valley, £13 10s.
Steel bars, export, f.o.b. Clyde, £17 5s.
Ferromanganese, £35, nominal.
Ferrosilicon, 50 per cent, c.i.f., £27.

Ferromanganese Supplies Light—General Situation Chaotic—American Steel Scarce

(By Mail)

LONDON, ENGLAND, March 7, 1916.—Railroad transportation and shipping are bristling with difficulties, and, with the increasingly serious labor position, the progress of business is greatly hampered, with no prospect of relief. Pressure of government requirements for war munitions continues the dominant factor, while the recent intervention of the government has led to sensational events in the Cleveland iron markets.

A fortnight ago to-day warrant prices were rushed up to 98s. 6d. for cash delivery on excited outside buying, but this advance proved only temporary, a dramatic collapse ensuing the next day to 86s. in London on the intimation of the authorities that home consumers had to be supplied by blast furnacemen at a price not exceeding 82s. 6d. based on coke at 30s. a ton. After the first rush to get out by speculative cliques, a moderate rally followed, but the market again collapsed to a level more closely approximating the special maximum price.

Further excitement was caused last week by the suspension of operations through the royal proclamation forbidding trading in war metals. A satisfactory understanding has been reached, however, enabling a resumption of operations under conditions involving the liquidation by May 31 of all open speculative contracts, the real object of the proclamation. There is still a nervous feeling as to future developments lest action should be taken by the government to assume complete control of the reserve stocks in order to protect domestic needs against exports. The drain meanwhile continues, output being now well below the pre-war level.

In sharp contrast to Cleveland, hematite iron has held up fairly well at about 140s. Negotiations are in progress between makers and the authorities for dealing with the big additional cost due to advances in ore freights. The output has been placed for months ahead, and prompt delivery iron is unobtainable.

THE MANGANESE SUPPLIES

The supply of ferromanganese continues very light, and terms have been raised by British producers to about £35 f.o.b. for shipment to America. Home prices are up to £30 loose. Indian manganese ore rules firm on

the basis of 2s. 5d. to 2s. 6d. a unit c.i.f. United Kingdom ports, business being difficult because of freight scarcity. Semi-finished steel has become seriously tightened. Welsh bars can hardly be secured at less than £13 locally while £13 10s. has been repeatedly secured for export. This shows a ridiculous discrepancy against £11 5s. which is now supposed to be the official price based on hematite at £7 a ton. English billets are practically nominal at about £13 with nothing to offer. American material is very scarce, importations being virtually prohibited by high freights and American agents on this side seem to have next to nothing to offer.

The quotation for North Staffordshire iron crown bars stands at £14 delivered locally. An official announcement is still awaited that the price of best bars has been fixed at £14 15s. and £13 10s. for common bars in view of the further advance lately reported which is indicative of the upward trend of values for all descriptions of finished material. Quotations for finished steel are very firmly held, makers being generally able to realize a premium over the prices fixed recently, but there are very few sellers for anything like near deliveries, and contracts are in arrears.

Buffalo

BUFFALO, N. Y., March 21, 1916.

Pig Iron.—So far only a small part of the inquiry reported as before the market last week has developed into orders. The aggregate bookings for the week were 12,000 to 15,000 tons, all grades. Over 1000 tons of Bessemer was sold at \$22, at furnace. A sale is reported of 300 tons foundry iron for Newfoundland for June delivery after the opening of the Erie Canal. The embargo status to New England points is still a troublesome factor in the way of shipments to the East. We quote, without change, as follows, for current and last half delivery, f.o.b. furnace, Buffalo:

| | |
|---------------------------------------|--------------------|
| No. 1 foundry | \$19.50 to \$20.00 |
| No. 2 X foundry | 19.00 to 19.50 |
| No. 2 plain | 18.75 to 19.00 |
| No. 3 foundry | 18.75 to 19.00 |
| Gray forge | 18.75 to 19.00 |
| Malleable | 19.00 to 20.00 |
| Basic | 19.00 to 20.00 |
| Bessemer | 21.00 to 22.00 |
| Charcoal, regular brands and analysis | 21.00 to 22.00 |

Old Material.—The market has been active with some price advances. Large sales of heavy melting steel are reported at \$17.50 to \$18, f.o.b., Buffalo. Some dealers have exceeded these figures in purchasing, expecting to sell at enhanced prices. The largest local consumer is still able to buy at present quoted figures. We quote dealers' asking prices, per gross ton, f.o.b., Buffalo, as follows:

| | |
|---|--------------------|
| Heavy melting steel | \$17.50 to \$18.00 |
| Low phosphorus steel | 21.00 to 21.50 |
| No. 1 railroad wrought scrap | 19.00 to 19.50 |
| No. 1 railroad and machinery cast scrap | 16.00 to 16.50 |
| Old steel axles | 24.00 to 24.50 |
| Old iron axles | 24.00 to 24.50 |
| Old carwheels | 15.25 to 15.75 |
| Railroad malleable | 16.00 to 16.50 |
| Machine shop turnings | 8.50 to 9.00 |
| Heavy axle turnings | 12.50 to 13.00 |
| Clean cast borings | 9.25 to 9.75 |
| Old iron rails | 18.00 to 18.50 |
| Locomotive grate bars | 12.00 to 12.50 |
| Stove plate (net ton) | 11.50 to 12.00 |
| Wrought pipe | 14.00 to 14.50 |
| Bundled sheet scrap | 13.00 to 13.50 |
| No. 1 busheling scrap | 15.00 to 15.50 |
| No. 2 busheling scrap | 12.00 to 12.50 |
| Bundled tin scrap | 15.00 to 15.50 |

The J. D. Farasey Mfg. Company, Cleveland, Ohio, has been incorporated with a capital stock of \$40,000 to take over the H. E. Teachout Boiler Works, owned by the late J. D. Farasey. Mr. Farasey's son, James Farasey, is president and treasurer of the new company; M. F. Farasey, vice-president, and N. E. Farasey, treasurer.

About 10,000 tons of Quebec chrome ore is estimated to have been mined and shipped in the last half of 1915. Its average content was probably 30 per cent chrome oxide and it came from the Coleraine-Black Lake region of Quebec. Most of the ore was sold to one firm in Philadelphia.

Iron and Industrial Stocks

NEW YORK, March 22, 1916.

The smoothing out of the Mexican situation was a strengthening influence in the stock market the past week, and for a short time the excellent condition of domestic business further supported an upward movement. On Monday of this week, however, intimations that peace might be expected in Europe at an early day, together with an unfounded report that American stocks held abroad were likely to be pressed for sale in greater volume, took the spirit out of speculation for higher prices and a sharp decline occurred all along the line, especially in the so-called war stocks. A lower range of prices was thus reached than had been touched for two or three weeks previously. Some recovery was experienced on Tuesday, but it was not important. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

| | |
|--|--|
| Allis-Chal., com.. 29 1/2 - 33 1/2 | Republic, com... 52 - 54 1/2 |
| Allis-Chal., pref.. 78 - 81 | Republic, pref... 109 1/4 - 111 1/2 |
| Am. Can, com... 61 1/2 - 65 1/2 | Sloss, com..... 57 - 60 1/2 |
| Am. Can, pref... 111 - 112 1/2 | Sloss, pref. 93 - 98 1/2 |
| Am. Car & Fdy., com. 68 1/2 - 74 1/2 | Pipe, com. 22 1/2 - 26 1/2 |
| Am. Car & Fdy., pref. 116 - 118 | Pipe, pref. 51 1/2 - 54 1/2 |
| Am. Loco., com.. 74 1/2 - 83 1/2 | U. S. Steel, com. 84 1/2 - 87 1/2 |
| Am. Loco., pref.. 103 1/2 - 104 | U. S. Steel, pref.. 116 1/2 - 117 1/2 |
| Am. Stl. Fdries., 53 1/2 - 56 1/2 | Va. I. C. & Coke. 53 - 55 1/2 |
| Bald. Loco., com. 104 1/2 - 114 1/2 | Westg. Electric.. 65 1/2 - 71 1/2 |
| Bald. Loco., pref. 109 1/2 - 112 1/2 | Am. Ship, com... 42 - 48 |
| Beth. Steel, com. 50 1/2 - 53 1/2 | Am. Ship, pref.. 87 - 90 |
| Beth. Steel, pref. 135 | Chic. Pneu. Tool. 70 1/2 - 79 |
| Case (J.I.), pref. 85 - 86 | Cambria Steel... 81 - 81 1/2 |
| Colo. Fuel..... 44 1/2 - 50 1/2 | Lake Sup. Corp. 10 - 11 |
| Deere & Co., pref. 94 1/2 | Pa. Steel, pref.... 98 1/2 |
| Gen. Electric.... 168 - 172 | Warwick 10 1/2 - 10 1/2 |
| Gt. No. Ore Cert. 43 1/2 - 47 1/2 | Cruc. Steel, com.. 87 1/2 - 99 1/2 |
| Int. Harv. of N. J., com. 109 1/2 - 110 1/2 | Cruc. Steel, pref.. 114 1/2 - 119 |
| Int. Harv. Corp., com. 70 | Harb-Walk. Refrac., com. 84 |
| Lacka. Steel.... 78 1/2 - 83 1/2 | Harb-Walk. Refrac., pref. 101 1/2 - 102 |
| Nat. En. & St., com. 25 1/2 - 28 | La Belle Iron, com. 50 - 51 |
| N. Y. Air Brake. 143 - 152 | La Belle Iron, pref. 129 |
| Pitts. Steel, pref. 94 1/2 - 98 | Am. Brit. Mfg., com. 25 - 35 |
| Pressed Stl., com. 53 1/2 - 57 1/2 | Carbon Stl., com. 74 - 80 |
| Pressed Stl., pref. 103 | Driggs-Seabury . 139 - 155 |
| Ry. Steel Spring, com. 40 1/2 - 44 1/2 | Midvale Steel... 66 1/2 - 71 1/2 |

Dividends

The E. W. Bliss Company, extra 1 1/4 per cent on the common stock in addition to regular quarterly 1 1/4 per cent; also regular quarterly 2 per cent on the preferred stock, all payable April 1.

The Union Switch & Signal Company, regular quarterly, \$1.50 on the common and preferred stocks, both payable April 15.

The Reed-Prentice Company, regular quarterly, 1 1/4 per cent on the preferred stock, payable April 1.

Manning, Maxwell & Moore, regular quarterly, 1 1/2 per cent, payable March 31.

The Otis Elevator Company, regular quarterly, \$1.50 on the preferred stock and \$1.25 on the common stock, payable April 15.

The Boston Belting Company, regular quarterly, \$2 a share, payable April 1.

The Crucible Steel Company of America, regular quarterly, 1 1/4 per cent on the preferred stock, payable March 31.

The Dodge Mfg. Company, regular quarterly, 1 1/4 per cent on the preferred stock, payable April 1.

Buffalo Machinists' Strike Over

The majority of the employees at the plants of the Pierce-Arrow Motor Car Company, King Sewing Machine Company and Ericsson Mfg. Company, Buffalo, N. Y., returned to work Tuesday morning on the same terms and conditions that existed prior to the lockout inaugurated by these companies March 2, immediately following the strike of union machinists. Only a small number of the machinists at these plants had gone out on strike, but to avoid annoyance to their men and other possible contingencies the managers shut them down until the strike disturbance had passed. Machinists broke from the ranks of the strikers and, with the other employees out of work, in the last few days gave the companies to understand they were ready to return. All matters as to wage increases and possible changes of working conditions are to be taken up after the men have started to work and they are to be treated with as employees of the respective companies and not as members of the union.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb., New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 73.9c. on plates, structural shapes and sheets and 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, $\frac{1}{4}$ in. thick and over, and zees 3 in. and over, 2.50c. to 2.75c. Extras on other shapes and sizes are as follows:

| | Cents per lb. |
|---|---------------|
| I-beams over 15 in. | .10 |
| H-beams over 18 in. | .10 |
| Angles over 6 in., on one or both legs | .10 |
| Angles, 3 in. on one or both legs less than $\frac{1}{4}$ in. thick, as per steel bar card, Sept. 1, 1909 | .70 |
| Tees, structural sizes (except elevator, handrail, car truck and conductor rail) | .05 |
| Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909 | .20 to .80 |
| Deck beams and bulb angles | .30 |
| Handrail tees | .75 |
| Cutting to lengths, under 3 ft. to 2 ft. inclusive | .25 |
| Cutting to lengths, under 2 ft. to 1 ft. inclusive | .50 |
| Cutting to lengths, under 1 ft. | 1.55 |
| No charge for cutting to lengths 3 ft. and over. | |

Plates.—Tank plates, $\frac{1}{4}$ in. thick, $6\frac{1}{4}$ in. up to 100 in. wide, 2.75c. to 3.75c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent, $\frac{1}{4}$ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered $\frac{1}{4}$ -in. plates. Plates over 72 in. wide must be ordered $\frac{1}{4}$ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of $\frac{3}{16}$ in. take the price of $\frac{3}{16}$ in.

Allowable overweight, whether plates are ordered to gage or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

| Extras | Cents per lb. |
|---|---------------|
| Gages under $\frac{1}{4}$ in. to and including $\frac{3}{16}$ in. | .10 |
| Gages under $\frac{3}{16}$ in. to and including No. 8 | .15 |
| Gages under No. 8 to and including No. 9 | .25 |
| Gages under No. 9 to and including No. 10 | .30 |
| Gages under No. 10 to and including No. 12 | .40 |
| Sketches (including straight taper plates), 3 ft. and over | .10 |
| Complete circles, 3 ft. in diameter and over | .20 |
| Boiler and flange steel | .10 |
| "A. B. M. A." and ordinary firebox steel | .20 |
| Still bottom steel | .30 |
| Marine steel | .40 |
| Locomotive firebox steel | .50 |
| Widths over 100 in. up to 110 in., inclusive | .05 |
| Widths over 110 in. up to 115 in., inclusive | .10 |
| Widths over 115 in. up to 120 in., inclusive | .15 |
| Widths over 120 in. up to 125 in., inclusive | .25 |
| Widths over 125 in. up to 130 in., inclusive | .50 |
| Widths over 130 in. | 1.00 |
| Cutting to lengths under 3 ft. to 2 ft. inclusive | .25 |
| Cutting to lengths under 2 ft. to 1 ft. inclusive | .50 |
| Cutting to lengths under 1 ft. | 1.55 |
| No charge for cutting rectangular plates to lengths 3 ft. and over. | |

Wire Rods.—Bessemer, open-hearth and chain rods, \$57, nominally.

Wire Products.—Prices to jobbers, effective Feb. 29: Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$2.25; galvanized, \$2.95. Galvanized barb wire and staples, \$3.25; painted, \$2.55. Wire nails, \$2.40. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Woven wire fencing, $61\frac{1}{2}$ per cent off list for carloads, $60\frac{1}{2}$ off for 1000-rod lots, $59\frac{1}{2}$ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

| | Plain Wire, per 100 lb. | | | | | | | | | |
|------------|-------------------------|--------|--------|--------|--------|--------|--------|--------|----|--|
| Nos. | 0 to 9 | 10 | 11 | 12 | 12½ | 13 | 14 | 15 | 16 | |
| Annealed | \$2.30 | \$2.35 | \$2.40 | \$2.45 | \$2.60 | \$2.70 | \$2.80 | \$2.90 | | |
| Galvanized | 3.20 | 3.25 | 3.30 | 3.35 | 3.40 | 3.55 | 3.90 | 4.00 | | |

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from March 15, 1916, on black and galvanized steel and iron pipe, all full weight:

| Steel | | | Butt Weld | | | Iron | | |
|---|-------|-------|---------------------------------|-------|-------|---------------------------------|-------|-------|
| Inches | Black | Galv. | Inches | Black | Galv. | Inches | Black | Galv. |
| $\frac{1}{8}$, $\frac{1}{4}$ and $\frac{3}{8}$ | 66 | 35½ | $\frac{1}{8}$ and $\frac{1}{4}$ | 55 | 24 | $\frac{1}{8}$ and $\frac{1}{4}$ | 55 | 24 |
| $\frac{1}{2}$ | 70 | 51½ | $\frac{3}{8}$ | 56 | 25 | $\frac{3}{8}$ | 56 | 25 |
| $\frac{3}{4}$ to 3 | 73 | 55½ | $\frac{1}{2}$ | 60 | 38 | $\frac{1}{2}$ | 60 | 38 |
| | | | $\frac{3}{4}$ to 1½ | 63 | 43 | $\frac{3}{4}$ to 1½ | 63 | 43 |
| Lap Weld | | | | | | | | |
| 2 | 69 | 51½ | 1½ | 52 | 32 | 1½ | 52 | 32 |
| 2½ to 6 | 72 | 54½ | 1½ | 58 | 39 | 1½ | 58 | 39 |
| 7 to 12 | 68 | 49½ | 2 | 59 | 40 | 2 | 59 | 40 |
| 13 and 14 | 58½ | .. | 2½ to 4 | 61 | 43 | 2½ to 4 | 61 | 43 |
| 15 | 56 | .. | 4½ to 6 | 61 | 43 | 4½ to 6 | 61 | 43 |
| | | | 7 to 12 | 59 | 41 | 7 to 12 | 59 | 41 |

| Reamed and Drifted | | | | | |
|--------------------|----|-----|---------------------------|----|----|
| 1 to 3, butt | 71 | 53½ | $\frac{3}{8}$ to 1½, butt | 61 | 41 |
| 2, lap | 67 | 49½ | 1½, lap | 50 | 30 |
| 2½ to 6, lap | 70 | 52½ | 1½, lap | 56 | 37 |
| | | | 2, lap | 57 | 38 |
| | | | 2½ to 4, lap | 59 | 41 |

| Butt Weld, extra strong, plain ends | | | | | |
|---|----|-----|---------------------|----|----|
| $\frac{1}{8}$, $\frac{1}{4}$ and $\frac{3}{8}$ | 62 | 40½ | $\frac{3}{8}$ | 55 | 34 |
| $\frac{1}{2}$ | 67 | 50½ | $\frac{1}{2}$ | 60 | 43 |
| $\frac{3}{4}$ to 1½ | 71 | 54½ | $\frac{3}{4}$ to 1½ | 64 | 45 |
| 2 to 3 | 72 | 55½ | | | |

| Lap Weld, extra strong, plain ends | | | | | |
|------------------------------------|----|-----|---------|----|----|
| 2 | 67 | 50½ | 1½ | 59 | 40 |
| 2½ to 4 | 70 | 53½ | 2 | 61 | 43 |
| 4½ to 6 | 69 | 52½ | 2½ to 4 | 63 | 46 |
| 7 to 8 | 64 | 45½ | 4½ to 6 | 62 | 45 |
| 9 to 12 | 59 | 40½ | 7 to 8 | 55 | 38 |
| | | | 9 to 12 | 50 | 33 |

| Butt Weld, double extra strong, plain ends | | | | | |
|--|----|-----|---------------------|----|----|
| $\frac{1}{2}$ | 58 | 43½ | $\frac{1}{2}$ | 47 | 31 |
| $\frac{3}{4}$ to 1½ | 61 | 46½ | $\frac{3}{4}$ to 1½ | 50 | 34 |
| 2 to 2½ | 63 | 48½ | | | |

| Lap Weld, double extra strong, plain ends | | | | | |
|---|----|-----|---------|----|----|
| 2 | 59 | 44½ | 1½ to 2 | 48 | 31 |
| 2½ to 4 | 61 | 46½ | 2½ to 4 | 50 | 36 |
| 4½ to 6 | 60 | 45½ | 4½ to 6 | 48 | 34 |
| 7 to 8 | 54 | 35½ | | | |

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipment on sheets, of U. S. standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent cash discount in 10 days from date of invoice:

| Blue Annealed Sheets | | Cents per lb. |
|--|--|---------------|
| Nos. 3 to 8 | | 2.85 to 2.95 |
| Nos. 9 to 10 | | 2.90 to 3.00 |
| Nos. 11 and 12 | | 2.95 to 3.05 |
| Nos. 13 and 14 | | 3.00 to 3.10 |
| Nos. 15 and 16 | | 3.10 to 3.20 |
| Above prices are for Bessemer stock. For open-hearth stock \$2 per ton advance is charged. | | |

| Box Annealed Sheets, Cold Rolled | | Cents per lb. |
|--|--|---------------|
| Nos. 17 to 21 | | 2.55 to 2.65 |
| Nos. 22 and 24 | | 2.60 to 2.70 |
| Nos. 25 and 26 | | 2.65 to 2.75 |
| No. 27 | | 2.70 to 2.80 |
| No. 28 | | 2.75 to 2.85 |
| No. 29 | | 2.80 to 2.90 |
| No. 30 | | 2.90 to 3.10 |
| Above prices are for Bessemer stock. For open-hearth stock \$2 per ton advance is charged. | | |

| Galvanized Sheets of Black Sheet Gage | | Cents per lb. |
|--|--|---------------|
| Nos. 10 and 11 | | 3.75 to 4.00 |
| No. 12 | | 3.85 to 4.10 |
| Nos. 13 and 14 | | 3.85 to 4.10 |
| Nos. 15 and 16 | | 3.95 to 4.20 |
| Nos. 17 to 21 | | 4.10 to 4.35 |
| Nos. 22 and 24 | | 4.30 to 4.55 |
| Nos. 25 and 26 | | 4.40 to 4.70 |
| No. 27 | | 4.60 to 4.85 |
| No. 28 | | 4.75 to 5.00 |
| No. 29 | | 4.90 to 5.15 |
| Above prices are for Bessemer stock. For open-hearth stock \$2 per ton advance is charged. | | |

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, on lap-welded steel tubes, in effect from March 15, 1916, and standard charcoal-iron tubes, effective from Feb. 29, 1916, are as follows:

| Lap Welded Steel | | Standard Charcoal Iron | |
|------------------|----|------------------------|----------|
| 1½ in. | 40 | 1½ in. | 37 to 38 |
| 1½ and 2 in. | 52 | 1½ and 2 in. | 41 to 42 |
| 2½ in. | 49 | 2½ in. | 38 to 39 |
| 2½ and 2¾ in. | 55 | 2½ and 2¾ in. | 45 to 46 |
| 3 and 3½ in. | 60 | 3 and 3½ in. | 49 to 50 |
| 3½ to 4½ in. | 61 | 3½ to 4½ in. | 51 to 52 |
| 5 and 6 in. | 54 | 5 and 6 in. | 45 to 46 |
| 7 to 13 in. | 51 | | |

Locomotive and steamship special charcoal grades bring higher prices.

1½ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

| Mar. | Lake | Electro-lytic | Tin, New York | Lead— | | Spelter— | |
|------|--------|---------------|---------------|----------|-----------|----------|-----------|
| | | | | New York | St. Louis | New York | St. Louis |
| 15 | 27.00 | 26.75 | 53.00 | 7.75 | 7.75 | 17.75 | 17.50 |
| 16 | 27.12½ | 26.87½ | 52.00 | 8.00 | 8.00 | 17.75 | 17.50 |
| 17 | 27.12½ | 26.87½ | 51.50 | 8.00 | 8.00 | 18.25 | 18.00 |
| 18 | 27.12½ | 26.87½ | ... | 8.00 | 8.00 | 18.25 | 18.00 |
| 19 | 27.12½ | 26.87½ | 50.50 | 8.00 | 8.00 | 18.25 | 18.00 |
| 21 | 27.12½ | 26.87½ | 49.62½ | 8.00 | 8.00 | 18.00 | 17.75 |

NEW YORK, March 22, 1916.

Copper is firmer after a short spurt of activity, but the market is dull again. Tin has eased off considerably following heavier arrivals. Lead is in big demand with independents taking the business at premium prices. Spelter is dull again after a short period of activity. Nearby antimony is scarce and higher.

New York

Copper.—Late last week there was a moderate amount of business in electrolytic at 27c., 30 days delivered, for June and July delivery, which gave the market a better tone. Some sellers who have little to offer are now asking 27.50c., 30 days delivered, but electrolytic can be had at 26.87½c., cash, New York. A large part of the recent dullness is attributed to the difficulty with which deliveries are made to New England consumers, because of railroad freight embargoes. Some of the mills in the Naugatuck Valley have been compelled to shut down temporarily, or at least curtail operations. In one instance a carload of Lake copper was forwarded from Buffalo to a New England point by express. Lake is nominally quoted at 27.12½c. for July and later delivery. The exports this month, up to and including yesterday, total 12,567 tons.

Tin.—Large arrivals in the past few days have caused some sharp declines in the quotations for spot tin. The arrivals of the month now total 2378 tons. On one steamer came 1135 tons, another 400 tons and another 215 tons, while in addition there have been smaller arrivals. The quotation for spot tin yesterday was 49.62½c., against 54c. the week previous. On March 16, with the larger arrivals in sight, there was some little pressure to sell spot. On the following day there was fair inquiry for spot and April and these positions were sold to the extent of about 150 tons, a little being done also for Eastern shipment. On Monday demand was active and 300 to 400 tons was taken at about 50.50c. Tin at dock was quoted at 49.50c., April at 46c. and shipment from London at 45.50c. Yesterday the market was dull and easy. The quantity now afloat is 5450 tons.

Lead.—The market continues to pursue a course without precedent and at times it is difficult to determine the actual level of prices. The nominal quotation of the American Smelting & Refining Company is 7c., New York, but the company is not selling at this figure. In fact, it will not sell at all for March, but will sell for April at the average of its own quotations that month. This means that consumers do not know what they will have to pay and their orders are going to independent producers who are quoting up to 8c. and over. Russia and Japan, especially the latter, have continued heavy buyers. Some sellers have refused to sell for export on the ground that it was their duty to take care of domestic consumers. Late last week sales were made at 8c. to 8.12½c., delivered at Pacific ports. On Wednesday last a fair business was done at 7.75c. to 7.80c., the prices prevailing at both New York and St. Louis. On Thursday it was almost impossible to gage the market, but sales were made on that day at 8c. to 8.25c., f.o.b. smelter. On Friday spot lead sold in New York at 8c. The attractive price caused a few resale lots to appear, a few consumers being among those willing to sell. On Monday there was a good demand, one inquiry alone calling for 1000 tons for export. Sales have been made this week on the basis of 8.12½c., delivered at Eastern points. The tendency is still upward and there is talk

of 10c. lead. The exports this month, up to and including yesterday, total 3473 tons.

Spelter.—Late last week the market became more active and prices went up a little, but this week opened quietly and there is now but little doing. The New York quotation for prompt is about 18c. and that at St. Louis, 17.75c. Spot is exceedingly scarce. The exports this month, up to and including yesterday, total 1295 tons.

Antimony.—The scarcity of spot metal is acute and 45c., duty paid, is quoted for Chinese and Japanese grades. The Japanese sellers are making some concessions. Forward shipments in bond are quoted at 34c.

Aluminum.—The market is quiet and the nominal quotations for No. 1 virgin aluminum, 98 to 99 per cent pure, are unchanged at 57c. to 60c.

Old Metals.—Quiet conditions continue. Dealers' selling prices are nominally unchanged, as follows:

| | Cents per lb. |
|--|----------------|
| Copper, heavy and crucible..... | 25.00 to 26.00 |
| Copper, heavy and wire..... | 24.00 to 25.00 |
| Copper, light and bottoms..... | 20.00 to 21.00 |
| Brass, heavy..... | 15.00 to 15.50 |
| Brass, light..... | 12.50 to 13.00 |
| Heavy machine composition..... | 18.00 to 19.00 |
| No. 1 yellow rod brass turnings..... | 16.00 to 16.50 |
| No. 1 red brass or composition turnings..... | 16.00 to 17.00 |
| Lead, heavy..... | 5.75 |
| Lead, tea..... | 5.25 |
| Zinc..... | 14.00 to 15.00 |

Chicago

MARCH 20.—The influence of the producers is again uppermost with respect to copper and prices are more settled. Spelter evidences a marked recovery and lead prices continue to soar. We quote: Casting copper, 26.50c.; Lake copper, 28c.; tin, carloads, 51.50c., and small lots, 53.50c.; lead, 8c.; spelter, 17.75c. to 18c.; sheet zinc, 25c.; Cookson's antimony, 50c.; other grades, 48c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 22c.; copper bottoms, 20c.; copper clips, 21c.; red brass, 18c.; yellow brass, 14c.; lead pipe, 6.50c.; zinc, 13.50c.; pewter, No. 1, 26c.; tinfoil, 37.50c.; block tin pipe, 42.50c.

St. Louis

MARCH 20.—Non-ferrous metals have been very strong during the week and there have been some very sharp advances. We quote to-day as follows: Lead, 8.75c.; spelter, 20c.; tin, 54c.; Lake copper, 30c.; electrolytic copper, 29.50c.; Asiatic antimony, 49c. In the Joplin ore district lead ore reached the highest point in the history of the district, with a sharp advance of \$10 per ton to \$100 per ton basis of 80 per cent metal, with an average price for the week's production of the whole district of \$94 per ton. Zinc blende sold with a range of \$95 to \$115 per ton basis of 60 per cent metal, an advance of \$15 per ton. The top settlement on premium grades reached \$121 per ton, with the average for the week's production of the entire district at \$98 per ton. Calamine sold at a range of \$75 to \$85 per ton, with a district average for the week's production of \$68 per ton. On miscellaneous scrap metals we quote as follows: Light brass, 10.50c.; heavy yellow brass, 13.50c.; heavy red brass and light copper, 16c.; heavy copper and copper wire, 19c.; zinc, 12c.; lead, 6c.; pewter, 24c.; tinfoil, 32c.; tea lead, 3.50c.

Recent exploration work in the region between 67 deg. and 68 deg. N. latitude and 25 deg. 30 min. and 27 deg. 30 min. E. longitude in Finland confirms the view often expressed that the Finnish Lapland contains vast deposits of high grade iron ore, equal to those of Swedish and Norwegian Lapland. Four deposits have been exposed. The construction of a railroad to make this ore available is under consideration by Finnish capitalists.

Plans are being prepared for the erection at Groton, N. Y., of twenty to twenty-five houses to help accommodate the steadily increasing number of employees of the Corona Typewriter Company, Inc.

PERSONAL

B. F. Jones, president Jones & Laughlin Steel Company, Pittsburgh, has returned from an extended visit to Falm Beach, Fla.

J. I. Andrews, general sales manager, American Sheet & Tin Plate Company, Pittsburgh, has gone to White Sulphur Springs, Va., on a vacation.

E. L. Fladd, formerly identified with the department in charge of the sale of slag, has been appointed assistant superintendent of the six blast furnaces of the Carnegie Steel Company at Youngstown, Ohio.

J. G. Butler, Jr., vice-president Brier Hill Steel Company, Youngstown, Ohio, and president of the Humane Society, has notified the latter organization that he will contribute \$10,000 toward a proposed fund of \$50,000 to erect a new Humane Society home.

George M. Basford has resigned as chief engineer of the railroad department of Joseph T. Ryerson & Son to become president of the Locomotive Feed Water Heater Company, 30 Church Street, New York, a newly organized corporation. He will also form the G. M. Basford Company to handle the advertising accounts of a number of railroad supply companies.

B. G. Welchans, formerly with the Canadian Westinghouse Company, Hamilton, Ontario, has been appointed general superintendent of the plant of Stanley G. Flagg & Co., Pottstown, Pa. Mr. Welchans has had an extended engineering experience with the Bethlehem Steel Company, Blake & Knowles Pump Company and American Locomotive Company. He is a member of the American Society of Mechanical Engineers.

The resignation of Judge William H. Moore as a director of the United States Steel Corporation has just become known publicly, although he withdrew nearly ten months ago. He became a director of the corporation at its formation in 1901. His retirement is stated to have been due to pressure of work in other directions. He is on the boards of a number of railroads and banking institutions. He was succeeded by Thomas Murray, assistant secretary of the corporation.

E. L. Haug, secretary of the United Steel Company, Canton, Ohio, has been elected president of the newly organized Canton Manufacturers' Association.

Quincy Bent, recently appointed general manager of the Steelton and Lebanon plants of the Pennsylvania Steel Company, was tendered a dinner by his former associates of the Maryland Steel Company, Sparrows Point, Md., on March 18. The affair was held at the Sparrows Point Club. Several tokens of remembrance were given him, the presentation address being made by M. J. Scammell, the new general superintendent of the Maryland Steel Company.

Joseph D. Oliver, president Oliver Chilled Plow Company, South Bend, Ind., has been elected a director of the First National Bank, Chicago, succeeding James J. Hill, who has resigned in accordance with the prohibition of interlocking directorates.

F. D. Walden, formerly of the Heald Machine Company, Worcester, Mass., has taken a position with the Davis Machine Tool Company, Rochester, N. Y., as manager in charge of operation. Peter Plantinga is in charge of the mechanical engineering department.

C. T. Myers has been appointed manager of the Timken-David Brown Company, manufacturer of worm gearing, Detroit, Mich.

J. A. Warfel, since 1909 identified with the oxygen business, and recently sales manager of the Superior Oxygen Company, Pittsburgh, is now secretary-treasurer and general manager of the company.

T. R. Galey has been appointed manager of a new office which the Asbestos Protected Metal Company, Pittsburgh, has opened in the Praetorian Building, Dallas, Tex. Mr. Galey has been associated with the company for the past four years, two years of which were spent at the Beaver Falls plant. As sub-agents in Texas territory are J. H. Hawley, Security Building,

Galveston, and Harry H. Hedges, First National Bank Building, Houston. At Atlanta, Ga., the company has opened a new office in the Hurt Building, in charge of J. H. Nichols, an engineer attached to the Chicago office, and for the past six months at Pittsburgh as assistant to H. E. Marks, vice-president.

The Franklin Railway Supply Company, 30 Church Street, New York, which is pushing its Stone-Franklin lighting equipment, has appointed Ralph G. Coburn sales manager of the electrical department. For the last few years he has been Eastern sales manager of the company, with headquarters in New York, where he will continue in his new capacity.

A. R. Murray, mechanical engineer and machine tool designer, Cincinnati Shaper Company, Cincinnati, Ohio, has resigned to accept a position as general manager for R. A. Jones & Co., Covington, Ky., makers of soap presses and automatic machines.

Nathan Owitz, formerly in the sales department of the Wheeler Condenser & Engineering Company, Carteret, N. J., has been elected sales manager of the J. P. Devine Company, Buffalo, N. Y., manufacturer of vacuum drying and impregnating apparatus and equipment required for the chemical and allied industries, rubber, etc. He will be located at the main office and works.

George B. Stephens is now superintendent of the Southern California Iron & Steel Company, Los Angeles, Cal., having succeeded Evan J. Moses.

W. A. Folger, head of the Pacific Tool & Supply Company, San Francisco, Cal., will shortly visit the principal tool manufacturing districts of the country.

Mrs. Alexander A. Arthur, widow of the founder of Middlesboro, Ky., was selected by Mayor J. L. Manning to light the fire for blowing in the Virginia Iron, Coal & Coke Company's blast furnace in that city. The furnace had been idle since July, 1909.

A. J. Colt, general manager of the Turnbull Wagon Company, Defiance, Ohio, for the past two years, has been elected president as well as general manager. The business of the company has been greatly increased under his direction.

R. H. Sweetser Resigns from Thomas Company

R. H. Sweetser presented his resignation as president and general manager of the Thomas Iron Company at the meeting of the board of directors at Easton, Pa., on March 16, and it was accepted, effective July 1. It is the intention that Mr. Sweetser remain with the company until his successor is chosen and has become familiar with the work. No one has yet been selected.

At a stockholders' meeting of the company on March 10 the proposal to issue the remaining \$400,000 of the \$1,000,000 of bonds authorized Feb. 26, 1914, was carried by a large majority. The company has decided to dispose of its Keystone furnace at Island Park, Pa., near Easton, instead of operating it. This furnace has been idle since 1911. It was built in 1876.

The Wisconsin Sheet Metal Contractors' Association, at its annual meeting in Milwaukee March 17, elected the following officers: President, Otto Geussenhainer, Sheboygan; first vice-president, J. B. Wallig, Kenosha; second vice-president, Louis Hoffman, Milwaukee; third vice-president, O. P. Schlafer, Appleton; fourth vice-president, C. Pantch, Racine; secretary, P. L. Biersach, Milwaukee; treasurer, R. C. Jeske, Milwaukee; sergeant-at-arms, William Gallun, Milwaukee.

The Chicago, Rock Island & Pacific Railway Company has had appointed, under the chairmanship of C. A. Morse, chief engineer, a committee to be known as the Reclamation Committee. It will be the province of this committee to decide on the materials, in addition to ordinary scrap, which the railroad may be warranted in scrapping and to consider the general problem of how far a railroad's reclamation work may or may not extend.

OBITUARY

H. S. Chamberlain

Capt. H. S. Chamberlain, whose name has been identified with the iron industry of the South for nearly half a century, died at Chattanooga, Tenn., March 15, after an illness of about three weeks, the first serious indisposition he had known. In taking indoor exercise in the morning, as had long been his custom, he had received a slight abrasion of the foot. It developed into



HIRAM SANBORN CHAMBERLAIN

a serious wound and amputation was finally resorted to. There seemed a good chance of recovery, but arterial complications followed. With Captain Chamberlain at the end were his wife, three daughters and two sons, all residing in Chattanooga. Had he lived another year he would have celebrated his golden wedding.

Hiram Sanborn Chamberlain was born in 1835 on a farm near Franklin, Portage County, Ohio. At 17 he entered the Electric Institute, afterward Hiram College, at Hiram, Ohio, James A. Garfield being then the president of that institution. Young Chamberlain's first business venture was in Iowa, where he remained until 1859, returning then to Ohio, and for several terms teaching school. He volunteered at the outbreak of the Civil War and served for two years with the Second Ohio Cavalry. He became a first lieutenant and later was quartermaster of his regiment. At Knoxville in 1863 he was promoted to be captain and given the important station of depot quartermaster. Late in the war he went to the field as chief quartermaster to General Stoneman. At Knoxville after the war he organized the firm of Chamberlain, Richards & Co., for the operation of a small rolling mill. It was made a stock company in 1867, with Captain Chamberlain as president. The plant is now operated by the Knoxville Iron Company. Captain Chamberlain pioneered in the Coal Creek coal region, and with Gen. John T. Wilders and others he organized the Roane Iron Company, building the first coke iron furnace in the South at Rockwood, Tenn., in 1869. The Roane Iron Company bought in 1870 a rolling mill at Chattanooga, which General Sherman had built for the Government in 1864 to re-roll iron rails. It was operated until 1877, when steel rails superseded iron. The company then put in two acid open-hearth furnaces, but gave up making steel rails after 50,000 tons had been rolled, the price having dropped in

the North from \$80 to \$35 meanwhile. The Roane Iron Company experimented with the Danks rotary puddling furnace in 1872, and later installed ten of them, but the cost was higher than with the old-style furnace and they were abandoned.

Captain Chamberlain was elected vice-president and general manager of the Roane Iron Company in 1871, and in that year took up his residence in Chattanooga. He and others organized the Citico Furnace Company in 1882. He was identified with numerous industrial enterprises in the Chattanooga district, and for many years had been one of that city's foremost men. Though he fought in the Union army, he won his way into the regard of many who had fought on the other side, and his high character and his manifest desire to allay the animosities of the war found a like response from those who had grown up in the South. He was active in educational and charitable undertakings, and for many years had been president of the board of trustees of the University of Chattanooga.

Captain Chamberlain was a notable figure at the meetings of the American Iron and Steel Institute, and for many years was equally prominent at the gatherings of the American Institute of Mining Engineers. Modesty was an outstanding trait of his character, yet his business contacts were many and his circle of acquaintance was large. No man in the iron trade was held in higher regard. He was a gentleman of the old school, one whom the newer generation of iron and steel men delighted to honor. Attendants at the Birmingham (Ala.) meeting of the American Iron and Steel Institute well remember the interesting paper he read, giving reminiscences and records of early iron-making in the South, particularly in Tennessee.

FERNAND S. BELLEVUE died at his home in New York City, March 18, aged 51 years. He was born in New Orleans and came North with his parents after the Civil War. He entered the employ of the Hecla Iron Works, Brooklyn, and rose steadily until at the time of his death he was a director and treasurer. He was unmarried.

WILLIAM F. DUTTON died at his home in Brooklyn, N. Y., March 18, aged 51 years, after a week's illness from pneumonia. He was born in Pittsburgh in 1865, and was employed in the tin-plate and kindred lines in that city. When the American Can Company was formed in 1902 he became a director and at the time of his death was purchasing agent. He was unmarried.

CHARLES M. HEWITT, president of the Hewitt Company, Chicago, manufacturer of railroad supplies, died suddenly, March 16, from apoplexy at Palm Beach, Fla. Mr. Hewitt had been in ill health for a number of years. He was born in Detroit, 59 years ago, and had been a resident of Chicago for 40 years.

BENJAMIN F. BOYD, vice-president Youngstown Engineering Company, Youngstown, Ohio, died at his home in that city March 12, aged 69 years. He was born in Washington County, Pa., and was one of the founders of the Youngstown Car Mfg. Company.

JOHN WATSON, proprietor of a machine shop at Trenton, N. J., who is said to have built the first automobile constructed in that district 15 years ago, died March 15, aged 81 years.

MAJOR JOHN F. DICKSON, founder and president of the Dickson Car Wheel Company, Houston, Tex., died March 5, aged 88 years.

WALLACE McDONALD, manager of the McDonald Shipyards at Mystic, Conn., died suddenly from heart disease, March 15.

J. LEE WELLS, manager of Bliss & Laughlin, Inc., Harvey, Ill., died Feb. 23. The company manufactures shafting.

The possibilities of some prime movers under new developments, including Diesel engines, unafrow engines, locomobiles and steam-gas units are to be discussed by a joint meeting of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers at Philadelphia on April 10.

Papers for Mechanical Engineers' Meeting

The papers to be read at the spring meeting of the American Society of Mechanical Engineers, to be held in New Orleans, April 11 to 14 inclusive, embrace the following:

"Organizing for Industrial Preparedness," by Spencer Miller, Lidgerwood Mfg. Company, New York City, and member of the Naval Consulting Board.

"Capacity and Economy of Multiple Evaporators," by E. W. Kerr, professor of mechanical engineering, Louisiana State University, Baton Rouge, La.

"Evolution of Low-Lift Pumping Plants in the Gulf State Country," by William B. Gregory, professor of experimental engineering, Tulane University, New Orleans.

"Mechanical Equipment Used in the Port of New Orleans," by William von Phul, Ford, Bacon & Davis, New Orleans.

"Establishing a Standard of Measurement for Natural Gas in Large Quantities," by Francis P. Fisher, assistant general manager of the Wichita Natural Gas Company, Bartlesville, Okla.

"Deviation of Natural Gas from Boyle's Law," by Robert F. Earhart and Samuel S. Wyer, consulting engineer, Columbus, Ohio.

"Some Experiments on Water-Flow through Pipe Orifices," by Horace Judd, associate professor of experimental engineering, Ohio State University, Columbus.

"Measurement of Viscosity and a New Form of Viscosimeter," by H. C. Hayes and G. W. Lewis.

"Dynamic Balance," by N. W. Akimoff, Philadelphia.

"Disastrous Experiences with Large Center-Crank Shafts," by Louis Illmer, chief engineer Lake Heat Engine Company, Milford, Conn.

"On the Transmission of Heat in Boilers," by E. B. Hedrick and E. A. Fessenden, associate professor of mechanical engineering, University of Missouri, Columbia, Mo.

The Trend in Large Power Plants

The prediction made a few years ago that the development in power generation would take the form of large stations at the source of the fuel supply is well illustrated in the program of construction of the West Penn Power Company, which now has a 60,000-kw. power station at Connellsville, Pa., is building a 150,000-kw. station at Wellburg, W. Va., and plans to build this year a 100,000-kw. plant on the Allegheny River at Freeport, Pa. The last two plants will virtually back up against coal mines. In a few years it is expected that a water power development will be made for the company on the Cheat River, W. Va.

The size of single power units is also conspicuously shown in the case of the West Penn plants. It is now having 40,000-hp. steam turbines built by the General Electric Company and the next unit to be bought may be one of 50,000 hp. The steam pressure to be employed may be as high as 600 lb. per square inch. The present voltage of transmission is 25,000, but 110,000 volt transmission is now under consideration at least from Wheeling to Washington, Pa., a matter of 25 or 30 miles, with 3-phase current at 60 cycles. At the present time the company has about 300 miles of high tension circuits following the rim, so to speak, of a wheel, with lower tension for distribution along the spokes of the wheel. Sargent & Lundy, Chicago, are engineers for the power plants in process of design and construction.

The Hoover Steel Ball Company, Ann Arbor, Mich., will double its plant this year. The new buildings, which will be fireproof, will comprise approximately 42,000 sq. ft. of floor space. The machinery and equipment have been ordered for the buildings and the entire new addition is expected to be in operation by Oct. 1. The company has orders booked ahead for a year or more. With its additional facilities it will have a production of 25,000,000 to 30,000,000 balls per day and will consume 350 tons of steel per month in their manufacture.

The Central Steel Company, Massillon, Ohio, has opened a branch office in the Lytton Building, 14 East Jackson Boulevard, in charge of A. Schaeffer, for the sale of open-hearth ingots, billets, blooms and slabs and special steel and alloy bars.

An Engineering Conference in Chicago

Engineering organizations are invited to send delegates to a conference on engineering co-operation to be held on Thursday and Friday, April 13 and 14, at room 1735 Monadnock Block, Chicago. The following items, among others, may be considered:

1. Co-operation among engineering organizations. Is it desirable? In what way is it practicable?

2. Benefits of co-operation in securing greater efficiency in the larger matters of concern to the individual engineer, to the profession, and to the public.

3. Methods of co-operation now in practice in various localities; results attained in Philadelphia, St. Louis, St. Paul and other places.

4. Various kinds of engineering societies and committees and the relative efficiency of their operations.

5. Relation of the specialized or exclusive national engineering societies to their local sections or branches and to the more inclusive local engineering society or club.

6. Result of co-operation in securing wider diffusion of knowledge on engineering subjects, as illustrated at Cleveland and elsewhere.

7. The engineering profession as a whole in its present condition as regards public esteem.

8. Reasons for decline in attendance at engineering colleges. Is it indicative of healthful conditions or of proper methods of education?

9. Employment; methods and results as practised by various engineering societies; an exchange of ideas.

10. Legislative activity, proper limits to be set, dangers to be avoided and needs of more systematic and better directed efforts.

The meeting has been called by the Committee on Engineering Co-operation, Dr. F. H. Newell, University of Illinois, Urbana, Ill., chairman, and C. E. Drayer, secretary Cleveland Engineering Society, secretary.

Cincinnati Planer Christmas Fund

The Cincinnati Planer Company, Cincinnati, Ohio, has issued a circular to its employees which is headed "A Christmas Saving Fund." This circular provides that under certain conditions and until further notice all employees who are not absent from work more than one working day each month, or who are not late more than once a week through the month, except in case of sickness, etc., will have placed in a Christmas saving fund 5 per cent of their total monthly wages and special bonus to draw interest at the rate of 3 per cent. This amount, including principal and interest for the month of November, 1916, is to be payable Dec. 23, 1916, to each employee who has complied with the conditions and is working for the company on that date. All employees are given a clear record for the months of January and February and will be credited with the full benefits of the fund for these two months. This is an addition to other methods of pay now in use in the company's plant.

The Wagner Electric Mfg. Company has started construction on two new buildings to augment its present factory group on Plymouth Avenue, St. Louis, Mo. Building No. 1, 90 x 140 ft., structural steel frame, with an open bay spanned by a traveling crane of 50 ft., will be devoted to punch press operations. Building No. 2, 90 x 160 ft., of reinforced concrete construction, will be used for various operations involving the production of small parts, including small punch press work. The new structures will be connected by a tunnel with the main section of plant No. 1. Contracts call for the completion of No. 1 by April 21 and of No. 2 by June 2. The designing of these buildings was done by the Condon Company, Chicago. Virtually the entire exterior wall area of both buildings is glass, insuring unexcelled daylight working conditions on every floor.

A new Japanese aluminum plant is reported to be established at Kachigawa, near Nagoya, with a capital of \$498,000. A rich deposit of clay nearby is to be used. Cessation of aluminum imports has advanced the price of the metal to such an extent that two of the three manufacturers of aluminum articles have been compelled to shut down.

Pittsburgh and Nearby Districts

Last week, as stated in THE IRON AGE, the Interstate Commerce Commission, acting on the application of the transcontinental railroads and the Pittsburgh iron and steel manufacturers for a 55-cent through rate from Pittsburgh to Pacific coast terminals, fixed a rate of 65 cents. It now appears doubtful whether the reduced rate will go into effect for some months, and it may possibly not become effective this year. The situation hinges on the Panama Canal, which has been closed for several months on account of slides. While announcement is made that the canal will be open again for freight service about April 15, this is regarded as doubtful. There is also the fact to consider that it would be hard to secure bottoms for Panama Canal traffic, as the boats that formerly went through the canal are now being used in the transatlantic trade, earning much more for their owners than they could possibly earn in Panama Canal service. The fact is that the Interstate Commerce Commission has only conceded the lower rate, but has not instructed it. No orders have been issued by the commission to the railroads to publish the lower rate.

The Huessener Engineering Company, 324 Diamond Street, Pittsburgh, has recently taken the following orders: American Steel & Wire Company, Donora, boiler burners; Struthers Furnace Company, boiler and stove burners; Emporium Iron Company, stove burners; Lackawanna Steel & Iron Company, boiler burners.

The report of the Pittsburgh Coal Company for the year 1915 shows gross receipts of \$26,791,984, an increase of \$1,337,684 over 1914. The net earnings for 1915 were \$4,219,837, against \$4,201,070 for 1914. The surplus was \$299,934, against \$17,409 in 1914. The net earnings after all charges and depreciation were equivalent to 6.124 per cent on the preferred stock. The report reviews the operations for the year and refers at some length to the plan of readjustment that has been submitted to stockholders.

Sheet metal workers in Youngstown and vicinity have made a demand for an increase in wages from 47½ to 58 cents an hour, to be effective May 1. The proposed rate will give journeymen \$4.64 per day of 8 hr.

According to a statement just issued by the deputy State fire marshal of Niles, Ohio, the total loss to property owners by fire during the strike riots in East Youngstown on Jan. 7 last was \$628,139.48.

The National Tube Company, Pittsburgh, is in the market for 15 to 20 electric cranes, ranging in capacity from 15 to 75 tons, to be installed in its new pipe mill to be built at Gary, Ind.

The Standard Seamless Tube Company, Pittsburgh, is in the market for one 10-ton, one 15-ton, one 30-ton and one 50-ton electric traveling crane.

Reports that the Westinghouse Electric & Mfg. Company, East Pittsburgh, has closed a contract to furnish the New York, New Haven & Hartford Railroad with fifty electric locomotives are untrue. Negotiations with that road have been in progress for some time, but nothing definite has yet resulted.

The three new 85-ton open-hearth furnaces being erected by the Youngstown Sheet & Tube Company at East Youngstown, Ohio, are expected to be ready for operation about July 1 next.

Net earnings of the Crucible Steel Company of America, Pittsburgh, for February, are unofficially given as \$1,950,000, being much the best showing in profits ever made by the company in any one month.

The annual meeting of stockholders of the La Belle Iron Works, Steubenville, Ohio, was held in Wheeling, W. Va., March 14. The old board of directors was re-elected. It will meet late this month and formally organize, when the present officers will also be re-elected.

The Philadelphia Company, Pittsburgh, the largest individual supplier of natural gas in western Pennsylvania, announces a sharp advance in rates for natural gas to manufacturers, effective April 1. A shortage in the natural gas supply developed during the recent cold weather, and many manufacturers who have depended more or less on this fuel will probably put in

artificial gas plants the coming summer. The gas companies state that they prefer to supply the domestic trade on account of the higher prices obtained.

The Pittsburgh Valve, Foundry & Construction Company, Pittsburgh, has bought the pipe fitting department of the Kennedy-Stroh Corporation, Oakmont, Pa., and will move the stock and patterns to its own plant. The Kennedy-Stroh Corporation has retired from the pipe-fitting business.

The Kelly & Jones Company, Pittsburgh, will erect a converter steel foundry building at its works at Greensburg, Pa., the exact details of which have not yet been worked out.

The item in THE IRON AGE of March 16, announcing the award of contract for the construction of a new building for Hubbard & Co., Pittsburgh, manufacturers of shovels, spades, etc., to replace one recently destroyed by fire, failed to specify that the building which was destroyed was the company's Pierce specialty plant. Its shovel, tool, bolt and washer plants were not damaged.

The city of Coshocton, Ohio, is in the market for a 3,000,000-gal. vertical triple expansion pumping engine.

New York City Wants a Purchasing Agent

For the first time in the history of the Municipal Civil Service Commission of New York City a competitive examination will be held for a position paying \$5,000. In the past all such places have been in the exempt or non-competitive classes. The position for which this examination will be given is that of director of the central purchase committee. The duties include the active direction of planning, installing, organizing and supervising a system of central purchase and control of all supplies bought by the city. The examination, which is open to residents of the State of New York over 30 years old, is divided into four parts: experience, thesis, oral and physical. Applicants must have had extended experience in an important executive position which has qualified them for the place and possess a thorough knowledge of scientific purchasing methods and of accounting control and a clear understanding of the legal conditions governing the making of purchases by the city. Applications for this position will be received at the offices of the commission, Municipal Building, New York City, until 4 p. m., March 31.

American exporters will shortly have an opportunity to land goods in Russia without interference or delay from government shipments. The American-Russian Chamber of Commerce, 60 Broadway, New York, has received a cablegram from the Russian-American Chamber of Commerce in Moscow announcing that the Pacific port of Nikolaievsk, at the mouth of the Amur River, Siberia, will be opened for navigation June 14. American exporters wishing to avoid the congestion and delays in sending freight by way of Vladivostok should direct steamers to Nikolaievsk. Goods received there will be transported up the Amur River to Stretyinsk, where connection is made with the railroad system.

The Wolverine Laboratories Company has opened a fully equipped commercial chemical testing laboratory at 445 Howard Street, Detroit, Mich. L. F. Miller, formerly chief chemist of the Timken-Detroit Axle Company, will be in direct charge. The company will specialize in analyses of iron, steel, coal, oils and nonferrous alloys. Announcement is made that this company has succeeded the Charles E. Wade Sales Company as sales agent for the Montgomery Chemical Works, Inc., Baltimore, Md., manufacturer of carbonizing compounds, for Michigan, Ohio, Indiana, Illinois and Wisconsin.

The Southern California Iron & Steel Company, Los Angeles, Cal., some weeks ago put in operation a 30-ton open-hearth furnace, supplementing the 15-ton furnace that has been operating since last April. The plant of the company was described in THE IRON AGE, May 20, 1915.

Machinery Markets and News of the Works

ORDERS RUN SMALLER

New Construction Will Create Demand

Production of Shell Fuses Is Backward and Will Receive More Attention—Lathe Deliveries Easier to Obtain

Most of the markets lay stress on the fact that there is a steady flow of orders for single machine tools, or at best, small groups of machines, a situation which is more agreeable than otherwise to the builders inasmuch as all of the makers of standard tools are still in the throes of making deliveries on orders booked some time ago.

Plant extensions continue to go forward on an extensive scale, particularly in New England, and a large amount of equipment will be needed in them. New England continues to suffer acutely from the freight embargo which is depriving plants of raw materials. Some of the factories have practically exhausted their stocks, the supplies of copper, iron and coke being very low. Some of the manufacturers have laid their plight before the railroad officials in an emphatic manner.

The New York market is quieter, but the general situation is good. It is pointed out in this market that while the allied governments are well supplied with steel shells, there is a great shortage of fuses, and that more attention will be given to their production both in this country and Canada in the future. Representatives of Great Britain have been endeavoring to spur on the fuse makers, and in one case a contract was cut in half because such slow progress was being made.

C. R. Kammerer, president Pittsburgh Galvanizing Company, Pittsburgh, is seeking manufacturers who can make deliveries of machinery for drawing seamless brass and copper tubing, and machines for forming brass cartridge shells.

The Splitdorf Electrical Company, Newark, N. J., has awarded the contract for the construction of a group of 6-story reinforced concrete buildings to cost over \$100,000.

The fast production of lathes has relieved the pressure for those tools, although there is still an active demand. Milling machines are active. Orders for traveling cranes are very heavy in Cleveland, due to the large amount of construction work under way.

In Detroit the Timken-Detroit Axle Company has started the erection of an addition to its plant, making the fourth one this year. The new building will be 4-stories and 40 x 163 ft.

The Allis-Chalmers Mfg. Company, Milwaukee, has recently taken several large contracts for power units and heavy machinery. The Graham Valve Company, Detroit, Mich., has plans for a plant to be built at St. Paul, Minn., to cost \$100,000.

Steel mills have recently placed some large orders for machine tools in Cincinnati. The foreign demand in that city is light, and the railroads are slow buyers also. The labor situation is unchanged, and while open threats of strike have been made by labor agitators, no definite steps have been taken, and prominent members

of the trade in Cincinnati are inclined to believe that no determined effort will be made to tie up the shops this spring.

The cancellation of orders on which deliveries are overdue is making the situation a little easier in Chicago.

The Fulton Iron Works, St. Louis, Mo., has increased its capital and will add to its equipment sufficiently to double its production of sugar mills and Diesel engines.

Fire destroyed the roundhouse and repair shops of the Louisville, Henderson & St. Louis Railroad, Gloverport, Ky., March 14, with a loss estimated at \$150,000, exclusive of rolling stock.

The Bucyrus Steam Shovel Company, Evansville, Ind., has taken a subcontract for high explosive 8-in. howitzer shells, held by the Mississippi Valley Metal Products Company.

In Canada interest is centered in the production of shells.

New York

NEW YORK, March 22, 1916.

With a view of increasing deliveries of fuses for shells, pressure is being brought to bear on manufacturers who hold contracts for supplying these parts. Some weeks ago it became apparent that Canada was giving more attention to the production of fuses, and the same is now true in the United States. It appears that the allied governments are being plentifully supplied with steel shells, but are not getting a sufficient number of fuses.

Some manufacturers have encountered great difficulty in turning out the number of fuses which their contracts called for, while others have done very well and in some cases have taken supplementary contracts. In one case deliveries of fuses were so backward that a contract was cut in half by Great Britain's representatives. Serious troubles also have been experienced in turning out gainers for high-explosive shells, the mechanism of which is equal to that of a watch. Some experts have criticized the design of the gainers.

The A. W. Wheaton Brass Works, Newark, N. J., is reported in the market for about fifty turret lathes. The inquiry of the Safety Car Heating & Lighting Company calls for two large turret lathes, five hand screw machines, two 16-in. Fox lathes and a low swing lathe.

A New York corporation is contemplating the taking of a large fuse contract and has been making inquiry for the necessary machinery, some of which will be installed in the plant of a New England hardware manufacturer if the order is booked. Another large order pending is for 1-pounder shells.

The general situation in machine tools is fairly good, although the demand from domestic sources has been a little quieter in the past week. The makers of standard tools are still absorbed in the problem of making deliveries, and a little quiet is not altogether unwelcome. Long-delayed deliveries are now being made in greater number by companies that entered the machine-tool field when the pressure of demand was greatest. Instances are mentioned where these deliveries were made only after lawsuits had been threatened. The export demand is light.

The Cincinnati, Hamilton & Dayton Railroad is in the market for a small list of tools.

C. R. Kammerer, president Pittsburgh Galvanizing Company, Twenty-sixth and Railroad streets, Pittsburgh, desires to get in touch with manufacturers of machinery for drawing seamless brass and copper tubing and machines for forming brass cartridge shells. Mr. Kammerer is interested on behalf of a new organization which intends to manufacture these products.

The Iroquois Foundries, 474 Genesee Street, Utica, N. Y., has been incorporated with a capital of \$25,000 to manufacture Rath white metal, aluminum, brass and bronze castings. In addition to the usual aluminum and brass foundry equipment, a plant will be installed for aluminum die casting.

All machinery, etc., is contracted for, with the exception of the aluminum die casting outfit, for which the company is seeking information. Charles J. Rath is president; Charles E. Day, vice-president; Harold E. Rath, secretary; and Fred Widmer treasurer and general manager. Messrs. Rath will have immediate charge of the manufacture of the non-ferrous metals and Mr. Day will be sales manager.

The De Mant Tool & Machine Company, 79 East 130th Street, New York City, has been incorporated with a capital stock of \$15,000 and is at present manufacturing gages, jigs and fixtures, but plans soon to take up the manufacture of small tools and automobile accessories. Sidney Diamant is president and Samuel A. Potter is treasurer. The company also controls the Gramercy Machine Company, 236 East Forty-third Street, New York. It is in the market for additional machine tools, including grinding, milling and shaping machines and lathes.

The International Arms & Fuse Company, maker of special ordnance, Bloomfield Avenue, Bloomfield, N. J., has filed plans for a small addition to its plant.

The Cornish Company, manufacturer of pianos and organs, Washington, N. J., advises that it is not planning the erection of new buildings, as has been reported elsewhere.

Elder & Wells, ice manufacturers, 65 Ninth Avenue, New York, have had plans drawn by Friedmann, Robertson & Keeler, 90 West Street, New York, for an extension to its plant, three and four stories, to cost about \$20,000. Contract has been awarded to W. L. & G. H. O'Shea, 29 Broadway, New York.

The Franklin Machine & Boiler Works, 13 Franklin Street, Brooklyn, N. Y., sustained a severe loss Feb. 26 when its plant was destroyed by fire. Plans are now under way for rebuilding on a larger scale than ever.

The Splitdorf Electrical Company, High and Warren streets, Newark, N. J., manufacturer of ignition apparatus, will construct a group of six-story reinforced concrete buildings and a powerhouse at a cost of over \$100,000. James N. Dayton is general manager.

Bids are being taken by the Sodus Packing Company, Sodus, N. Y., for the erection of an addition to its factory, 50 x 125 ft., 2 stories.

Bowes Brothers, Inc., Utica, N. Y., has been organized by H. L. J. A. and C. S. Bowes, with a capital stock of \$75,000, to manufacture fibre products, stationery, office supplies, etc.

The Symington Machine Corporation, Rochester, N. Y., has been incorporated with a capital stock of \$1,000,000 to manufacture machinery, tools, devices and instruments of all kinds. The incorporators are J. B. Summerfield, 71 Wall Street, W. Haviland, 60 Ann Street, and A. N. Taylor, 20 Nassau Street, New York City.

The Champlain Pulp & Paper Corporation, Saratoga Springs, N. Y., has been organized by I. A. Wait, W. E. Bennett and B. P. Wheat, with a capital stock of \$20,000, to manufacture paper.

The Ingersoll-Rand Company, New York City, has completed plans and awarded contracts for an extension to its machine shop at Painted Post, N. Y.

The Johnson Machine Tool Company, Gouverneur, N. Y., has been incorporated by S. H., S. F. and E. G. Hartley, with a capital stock of \$25,000, to operate a machine and repair shop and to manufacture machinery, tools, etc.

The Turner Construction Company, 11 Broadway, New York, has been awarded contract by W. A. Rogers, Ltd., Niagara Falls, N. Y., for the erection of a three-story and basement concrete addition, 80 x 210 ft., at Main Street and the Hydraulic Canal.

The House Wheel Company, Buffalo, capitalized at \$2,000,000 by Henry A. House, Jr., Mitchel H. Mark and Eugene L. Falk, will at once establish and equip a factory in leased premises to manufacture wire wheels for automobiles. Later it will acquire a site in Buffalo and erect a plant.

The German Rock Asphalt Company, Buffalo, has been incorporated, with a capital stock of \$150,000, by E. C. Schlenker, A. E. Barger and A. E. O'Grady to manufacture machinery and devices for heating plants, a smoke regulator, etc.

The Eastern Tablet Company, North Albany, N. Y., is having plans prepared for a one-story addition to its plant.

Plans have been completed for a one-story brick factory, 150 x 500 ft., to be erected at Middle Dock, Ossining, N. Y., by Charles G. Washburn.

The Eastern Grain, Mill & Elevator Company, Buffalo, will erect a reinforced concrete addition to its elevator at Buffalo River and the Lake Shore Railroad, to cost \$176,000.

The General Abrasive Company, manufacturer of natural and artificial abrasives, Niagara Falls, N. Y., has increased its capital stock from \$105,000 to \$157,000 to take care of its largely increased business. It expects to double its capacity, and even then will not be able to take care of all the business offered it. F. D. Hamilton is president.

Philadelphia

PHILADELPHIA, Pa., March 20, 1916.

The Hamburg Boiler Works, manufacturer of tanks, Hamburg, Pa., is in the market for a set of second-hand angle bending rolls and a pneumatic flanging machine. Henry Seiders is proprietor.

The L. H. Gilmer Company, Tacony, Pa., manufacturer of cotton belting, has taken bids for the construction of a two-story and basement brick factory addition, 50 x 100 ft., to cost about \$15,000. It is expected to be in operation within three months. Other additions are planned to be started next summer.

The IXL Pump & Mfg. Company, North Ninth and North Darien streets, Philadelphia, manufacturer of plumbing goods, has awarded contract to Burd P. Evans & Co., Thirteenth and Wallace streets, Philadelphia, for alterations to its plant which will increase its floor space about 1000 sq. ft. at a cost of about \$1,300.

The Graham Roller Bearing Company, Coudersport, Pa., has been incorporated with a capital stock of \$25,000 to manufacture machinery. It has taken over the A. L. Carter patent roller bearing separator for \$10,600 from D. F. Graham, A. L. Carter, R. F. Hibbard, Earl Porter and Ray Schaffner, of Coudersport, Pa. The incorporators include these five and W. H. Wright, Buffalo; F. George Walker, B. N. Blackslee, W. S. Bundy, C. A. Kaess and Earl Porter, all of Detroit; E. J. Hess, Cincinnati; Sterling Johnson, Walkerville, Canada, and N. E. Whalberg, Pontiac, Mich.

The De Long Hook & Eye Company, Broad and Wallace streets, Philadelphia, Pa., has purchased property, 100 x 225 ft., at Twenty-first and Clearfield streets, Philadelphia.

Fuller & Uhlman, Inc., Philadelphia, has been incorporated with a capital stock of \$5,000 by Leo H. Fuller, 16 South Twentieth Street; Martin Rosenfeld, 1641 South Fifth Street, and Israel Fisher, 1004 Jackson Street, Philadelphia, to manufacture dairy equipment and supplies.

The E. H. Myers Mfg. Company, Myerstown, Pa., has been incorporated with a capital stock of \$15,000 by Charles C. Looze, Myerstown, treasurer, and twenty-nine others, to manufacture machinery and tools, and operate a foundry and machine shop.

The Serfas Motor Car Company, Lehigh, Pa., has been incorporated with a capital stock of \$75,000 by Theodore A. Serfas and J. E. Knappenberger, Lehigh, and Joseph D. Hillpot, Pottsville, to manufacture bicycles, automobiles and motor accessories.

The Rosen Mfg. Company, Philadelphia, Pa., has been incorporated with a capital stock of \$5,000 by Frank and Rose Price, 5734 Christman Street; Frank Rose, 2434 South Third Street, to manufacture gas and electrical fixtures.

The Hill & Way Company, Philadelphia, has been incorporated with a capital stock of \$10,000 by Andrew H. and Marie C. Hill, 5827 Ashland Avenue; H. Berkley Why, 312 Earlham Terrace, to install heating, ventilating and power plants and products.

The Frick Company, Waynesboro, Pa., has obtained a contract to build a refrigerating plant to be installed in the new abattoir of the Union Abattoir Company, Amsterdam, Pa.

The Alston Saw & Steel Company, manufacturer of hack saw blades, Folcroft, Pa., advises that the recent statement that it would move its plant to Bristol is absolutely untrue.

Baltimore

BALTIMORE, Md., March 20, 1916.

The P. J. Hentschel Machine Company, 103 Mercer Street, Baltimore, has purchased the property at 703 and 705 Hillen Street, and will move to the new location.

William C. Robinson & Son Company, dealer in oils, 32 South Street, Baltimore, will erect a one-story brick boiler house, 22 x 39 ft., at Dock and Caroline streets. The Consolidated Engineering Company, Calvert Building, has the contract.

Adam F. Bautro, 616 South Broadway, Baltimore, and L. Emerson Hoffman, have applied for patents on an armored aeroplane. A company is being formed to make it, and it is stated the capital stock will be \$500,000, which has been subscribed.

Fire on March 17 destroyed the showcase and store fixture plant of the F. X. Ganter Company, Leadenhall and Ostend streets, Baltimore. The plant will be rebuilt.

A garage will be established at 2009-2021 Vine Street, Baltimore, by William N. Hildebrand, 112 North Payson Street.

Plans are being made by Davis & Hemphill, machinists,

Elkridge, Md., to install machinery in a building which will be erected.

The Wilmington Leather Company, Wilmington, Del., will build an addition, to cost \$3,000, to its plant at Second Street and Greenhill Avenue.

Announcement has been made that the DuPont Powder Company, Wilmington, Del., will establish an additional plant near Yorktown, Va., on the York River.

Prices on electric and ice plant machinery are being sought by H. O. Lyne, Orange, Va.

The Baltimore Concrete Works, Baltimore, has been incorporated with \$25,000 capital stock to manufacture concrete and bricks by Aaron E. Cohen, 416 Equitable Building, Ethel Shochet and Ernest Lachman.

New England

BOSTON, MASS., March 20, 1916.

The troubles of the manufacturers on account of the freight congestion and embargoes continue to be the chief factor in New England industry. On March 20 the New York Central Lines announced a new embargo on east-bound freight against the Boston & Albany and the Boston & Maine railroads. It is predicted that an embargo will soon have to be placed against west-bound freight by these two roads. At Waterbury, Conn., March 19, an animated session was held between officials of the New Haven lines and the local manufacturers and merchants. Conditions in Waterbury are much worse than in any other New England city, and John H. Goss of the Scovill Mfg. Company stated that his company and most of the others were down to their last resources. Some of the larger manufacturers offered to furnish assistance to smaller companies in unloading cars; but expressed in forceful terms the belief that that was not the real difficulty. A committee was appointed to co-operate with the railroad in straightening out the local congestion. The effect of the embargoes is felt not alone by the manufacturers, but also by builders and merchants. From all sides come reports of communities that are short of or entirely out of such commodities as kerosene, shoes and similar goods of general consumption. It is hoped that the executive committee of the Eastern railroads, appointed at a meeting in New York, March 16, to co-operate with Interstate Commerce Commissioner E. E. Clark, will find some way to clear up the existing congestion before a general closing down of factories becomes necessary.

The Farrel Foundry & Machine Company, Ansonia, Conn., has awarded a contract for an addition, 40 x 100 ft., two stories.

The H. A. Matthews Mfg. Company, Seymour, Conn., is building an addition, 70 x 100 ft., one story.

The General Fire Extinguisher Company, Providence, R. I., will build an addition, 65 x 160 ft., to the pipe shop at its Cranston, R. I., plant; also an addition, 22 x 65 ft., to the pipe bending shop.

The Yale & Towne Mfg. Company, Stamford, Conn., has begun the erection of an addition, 30 x 60 ft., one story, to its foundry.

The Lake Torpedo Boat Company, Bridgeport, Conn., is offering 10,000 shares, par \$10, of seven per cent cumulative preferred stock to its present shareholders on a pro rata basis. It is understood this is preparatory to enlarging the capacity of the plant.

The Hi-Lo Jack Company, Worcester, Mass., has been incorporated with capital stock of \$150,000, to manufacture a new type of lifting jack. J. Howard Joynes is president; Amos F. Lanier, vice-president and general manager, and George R. Hurlburt, secretary.

The Stanford Steel Products Company, Milford, Conn., has awarded a contract for the erection of a steel rolling mill.

The Bay State Foundry Company, Westfield, Mass., has been incorporated with capital stock of \$30,000 by William C. Waldron, Theodore R. Brien and Harry B. Putnam.

The Goddard Spark Plug Company, Westboro, Mass., has been incorporated with capital stock of \$50,000. Albert H. Goddard is president and Lucius E. Thurber, Athol, Mass., is treasurer.

The O. K. Tool Holder Company, Shelton, Conn., has awarded a contract for an addition, 40 x 80 ft., four stories.

The Model Tool & Gauge Company, Bridgeport, Conn., has been incorporated with capital stock of \$10,000 by Michael J. Lane, Johnson Lofthouse and Archie Shield.

The Norton Company, Worcester, Mass., has awarded contract for two additions to its recently erected plant 6: one, 60 x 178 ft., four stories; the other, 80 x 112 ft., two stories.

The Vernon Machine Company, Worcester, Mass., has been incorporated with capital stock of \$10,000. Vernon F. Prentice is president; Victor E. Rolander, vice-president; Harry V. Prentice, treasurer, and Chester W. Warren, clerk. The company will build lathes. Vernon F. Prentice will supervise production and Harry V. Prentice will look after finances and sales.

The Winchester Repeating Arms Company, New Haven, Conn., has been awarded permits for the erection of two transformer houses, a heating plant and a fuel oil storage building.

The E. M. Cross Machine Company, Berlin, N. H., has been incorporated with capital stock of \$25,000.

Chicago

CHICAGO, ILL., March 21, 1916.

Machinery sales out of Chicago stocks of new and used tools, as reported by several dealers, absorbed practically all of the desirable offerings of lathes, shaping, milling and grinding machines. There is a steady buying of individual machines. Deliveries are beginning to be available of various lathes, the manufacture of which was inaugurated in the fall of last year; and prompt shipment can be had by those buyers whose specifications can be satisfied. It is also understood that some tools, long overdue on orders, are being cancelled and such tools as can be secured at once are being substituted. This should bring some relief in the application of these released machines against other orders. Reports of deliveries of 60 days for standard lathes are perhaps a reflection of such instances.

Machine tool builders are still buying equipment for their own shops. The Chard Lathe Company is purchasing a Cincinnati planing machine large enough to take eight lathe beds simultaneously, a Kearney & Trecker milling machine, a shaping machine and other smaller tools. It has now brought its production up to thirty-five 18-in. lathes per month and will shortly add to its line the 20-in., 24-in. and 28-in. sizes. Bertsch & Co., Cambridge City, Ind., are considering the purchase of two planing machines, one having four heads and the other three, and one to be not larger than 18 x 72 ft. and the other 16 x 36 ft., also a horizontal boring mill and a single head 30-in. traverse shaping machine. Other inquiries for miscellaneous tools are noted in connection with reports of plant extensions. In some instances inability to secure all of the tools necessary to operating is postponing the buying of any equipment for new enterprises. There has been no announcement of awards as yet in connection with recent railroad inquiry. The Chicago Association of Commerce is in receipt of an inquiry from Norway for a large list of machinery suitable for the manufacture of arms. The Alaskan Engineering Company, Seattle, is in the market for a general list of machinery for railroad construction requirements.

The Inland Steel Castings Company, Terre Haute, Ind., incorporated to take over the business of the Inland Steel Casting Company, J. W. Ijams, receiver, advises that it will build an addition to its foundry.

The Paragon Foundry Company, Oregon, Ill., has leased the Oregon foundry, which it will place in operation at once.

The Western Iron Construction Company, Chicago, has been incorporated with a capital of \$5,000 by Niels Buck, 105 South LaSalle Street; M. J. Mears and R. H. Crackel.

The Rex Pump Company, Chicago, has been organized with a capital of \$10,000 by Abram Z. Zietlein, Robert Elson and Hyman Soboroff, 159 North Clark Street.

The Universal Valve Company, Chicago, has increased its capital stock from \$50,000 to \$100,000.

The Marvel Steel Products Company, Chicago, has been incorporated with a \$25,000 capital stock by John C. Leiger, Daniel F. Ramsey and Theodore F. Ehler, 712 West Thirty-third Street.

H. H. Walker, 5 North La Salle Street, Chicago, will build a one-story brick factory, 146 x 150 ft., at the southeast corner of Taylor and Waller avenues, to cost \$24,000.

The Sherwin-Williams Company, Chicago, will erect an additional manufacturing building, 124 x 266 ft., at its Kensington plant, to cost \$40,000.

The Nestor Johnson Mfg. Company, North California Avenue, Chicago, has had plans prepared for a two-story manufacturing building.

The German-American Portland Cement Works, La Salle, Ill., has let the general contract for additions to its plant to the Samuel Austin & Son Company, Cleveland, Ohio, calling for 1200 tons of steel. It is expected that the present extension work will involve an expenditure of about \$500,000.

Theodore Christenson, 2306 Tenth Street, Sioux City,

Iowa, is building a foundry, 40 x 50 ft., which will cost \$2,500.

The properties of the Smedley Steam Pump Company, Dubuque, Iowa, will be sold at auction April 15. They include real estate and buildings, together with lathes, cranes, brass furnaces, dynamos, machines, patterns, tools, raw material and stock on hand for foundry machine purposes and general supplies used in carrying on the business of the company. Philip Schwinn is receiver.

The Northern Iowa Power Company has bought the plant of the Sheldon Light & Power Company, Sheldon, Iowa, and will spend \$60,000 in improvements.

The Hildred-Nelson Company, St. Paul, Minn., incorporated with a capital of \$50,000, will build a factory either in the Midway or at North St. Paul, for the manufacture of engines, boilers and heavy hardware supplies.

The McCadden Machine Works, St. Cloud, Minn., has been incorporated with a capital of \$50,000 to manufacture piston rings, automobiles, aeroplanes, motorboats, machinery and machine parts.

The Graham Valve Company, Detroit, Mich., has plans for a foundry to be built at St. Paul, Minn., to cost \$100,000.

The Wisconsin Railway, Light & Power Company, Winoona, Minn., will build a power house and electric light plant, 55 x 90 ft., to cost \$200,000. R. M. Howard is manager.

The Northwestern Vacuum Churn Company, St. Paul, Minn., which has been incorporated with a capital of \$200,000, will build a plant in that city to cost \$200,000.

The Minnesota Furnace Supply Company, St. Paul, Minn., will build a factory.

Fire destroyed the finishing mill of the American Carbolite plant, Duluth, Minn., entailing a loss of between \$15,000 and \$20,000.

The Minneapolis Steel & Machinery Company will erect several additions to its plant, to cost about \$20,000.

Detroit

DETROIT, MICH., March 20, 1916.

The M. & S. Gear Company, Detroit, manufacturer of differential gears, has increased its capital stock from \$1,000,000 to \$1,750,000, and is installing a quantity of new machinery. Lewis H. Scurlock has been elected president and general manager.

The Detroit Auto Specialty Company, Detroit, has let the contract for the erection of a one-story addition to its plant.

The Castaluminum Body Company, Detroit, has been incorporated with \$100,000 capital stock to manufacture car bodies and frames. Robert F. Byer, W. A. Watts and C. B. Bohn are stockholders.

The Detroit Welding & Mfg. Company, Detroit, has been incorporated with \$10,000 capital stock to do a general metal stamping, forging and foundry business. The incorporators are F. E. Fisher, L. C. Smith and F. E. Shailor.

The State Board of Agriculture, Lansing, Mich., has authorized E. A. Bowd, architect, to prepare plans for a new engineering building and shops to replace the buildings at the Michigan Agricultural College, recently destroyed by fire.

The Belknap Wagon Company, Grand Rapids, Mich., will enlarge its plant by the erection of an additional building to manufacture automobile bodies.

The Sligh Furniture Company, Grand Rapids, Mich., will add another story, 80 x 290 ft., to its plant.

The National Photo Paper Company, Grand Rapids, Mich., has been incorporated with \$50,000 capital stock to manufacture photographic paper and has plans for a factory. The incorporators are E. A. Clements, Frank B. Myers, and others.

The Lane Motor Truck Company, Kalamazoo, Mich., has been incorporated with \$25,000 capital stock to manufacture automobile trucks. M. H. Lane heads the company.

The Timken-Detroit Axle Company, 136-210 Clark Avenue, Detroit, Mich., recently started construction on the fourth addition to its plant within a year. This extension, which will be to the main plant, will be 40 x 163 ft. long, four stories, to be used entirely for manufacturing, and will cost about \$175,000. When the 33 drop-forge hammers are installed in its new drop-forge plant the forge will have a capacity of over 420,000 drop-forgings per month.

The Billington Company, a new corporation which has purchased the business and machinery of the Winner Tile Machine Company, St. Louis, Mich., has leased a building at Bay City, Mich., and will conduct a general machine shop. It will also continue the manufacture of the Winner tile machine.

The W. K. Prudden Company, Lansing, Mich., has awarded the contract for its new factory building, to be

70 x 685 ft., with three stories and basement, and to cost \$98,000.

The J. B. Armstrong Company, Flint, Mich., is building a one-story factory, 78 x 132 ft., and 26 x 127 ft.

The W. J. Baird Machinery Company, 54 Jefferson Avenue, Detroit, Mich., dealer in new and second-hand machinery, which was recently incorporated after about three years' existence, will increase its lines by the addition of small tools and shop supplies. The company would like to get in touch with manufacturers with a view to taking selling agencies. It has secured E. B. Tompkins, recently manager for the Detroit Auto Specialty Company, as manager of the new department.

Milwaukee

MILWAUKEE, WIS., March 20, 1916.

The revival in the demand for power units and heavy machinery is the feature of business in the Milwaukee district. The Allis-Chalmers Mfg. Company has taken several large contracts, including pumping engines, turbines and one large flour mill. It has been a long time since any business of importance has been done in these lines. Several municipal and private hydroelectric installations are before bidders after an almost utter absence of such specifications for two years or more. Machine-tool builders report a steady run of small orders, forming an excellent and most satisfactory volume, but large-lot business has decreased materially. Bookings will keep all tool builders busy at the present extended schedules until well into 1917. Shops and factories in nearly every line of industry continue to prepare for extensions to properly handle their orders. The used machine-tool market is almost bare of material, although large volumes are handled. The turn-over is more rapid than at any previous time.

The tenor of Wisconsin industry is shown by the speedy answer to the Government's call for certain army and navy equipment. The Jeffery Company, Kenosha, rushed 27 quadruple drive trucks and the Harley-Davidson Company, Milwaukee, hurried out 17 special motorcycles to the Mexican border within a few hours after the receipt of the order, regular orders being sidetracked for the moment.

The Berlin Machine Works, maker of wood-working machinery, Beloit, Wis., has changed its corporate style to the P. B. Yates Machine Company. The company explains that since it was organized 40 years ago and took the name of the little Wisconsin city of Berlin, where it originally was located, numerous manufacturers in cities of the same name in various states have adopted a similar title. The new name is taken from that of the president, Porter B. Yates. The change is confined to name only, the personnel, officers, capital and policy remaining as heretofore. The company is preparing to erect a large works addition at Beloit, but plans have not matured. L. D. Forbes is secretary.

The J. B. D. Resilient Wheel Mfg. Company, maker of ball-bearing steel wheels for motor vehicles, 671 Smith Street, Milwaukee, has increased its capital stock from \$30,000 to \$50,000, to take care of its enlarged business. J. B. Drahonowsky is general manager.

The Crown Brush Company, Milwaukee, has been incorporated with \$20,000 capital stock by Hans DeTroy, Frank Meller and B. H. Osborn, to manufacture wire and straw brushes.

The Kimberly-Clark Company, Neenah, Wis., has awarded a contract to the Foster Construction Company, Milwaukee, for erecting a brick and steel addition, 40 x 90 ft., to the power house at the two paper mills in Appleton, Wis. Two large turbines will be installed.

The Badger Auto Body Company, Milwaukee, has been incorporated with a capital stock of \$10,000 by H. J. Trost, T. F. Hayden and B. Beebe to manufacture metal and wood automobile bodies.

Klasen & Wittlinger, Oshkosh, Wis., have established a sheet metal works and general repair shop at Kaukauna, Wis.

The Automatic Cradle Mfg. Company, Stevens Point, Wis., has awarded the general contract to Frank Spalenka, Stevens Point, for erecting a four-story brick addition, 80 x 290 ft., to its factory, and a dry kiln. The new power house will not be built until fall. John Josephkiewicz is president.

The Power Engineering Company, 512 Corn Exchange Building, Minneapolis, Minn., is ready for bids for the erection of a hydroelectric plant and power dam for Shawano, Wis., on the Wolf River. The investment will be about \$60,000.

The Kenfield-Lamoreaux Company, box factory and

veneer mill, Washburn, Wis., is purchasing a small list of new wood-working and nailing equipment.

The Colfax Light & Power Company has been incorporated at Colfax, Wis., with a capital stock of \$25,000 by Carl O. Wesley R. and Melvin B. Larson.

Plans for a new high school costing \$75,000 at Shawano, Wis., are being prepared by Robert A. Messmer & Bro., architects, 1004 Majestic Building, Milwaukee. A manual training department is included.

The business conducted by the Klipper Mfg. Company, Beaver Dam, Wis., has been incorporated under the same style. The capital stock is \$25,000 and the incorporators are W. F. Zimmermann, R. R. Scholz and Nicholas Schweiger.

William C. Schultz & Son, machine shop proprietors, Liberty Avenue and Sixth Street, Beloit, Wis., are building an addition for gas engine and electrical repair and construction work.

The board of education, Antigo, Wis., plans a new high school, costing \$80,000, including a manual training department. E. J. Goodrick is president of the board.

A large installation of oxy-acetylene welding and cutting apparatus has been made by George A. Raguse, owner of the Beloit Nickel Plating Works, Beloit, Wis.

The R. Gumz Company, Muskego Avenue and Canal Street, Milwaukee, is preparing to build a refrigerator house to cost \$20,000. Plans by Charles L. Lesser, architect, West Allis, call for a three-story reinforced concrete structure, 34 x 75 ft. Bids will be taken about April 5.

The Northern Machine Works, Wausau, Wis., is planning to undertake the manufacture of several specialties invented by Edward C. Helmke, consisting of a wheel hub for quadruple drive and a portable stone picker.

The Milwaukee County Board will take bids after April 1 for the erection of a chair factory unit at the new house of correction group in North Milwaukee. The building, designed by Leenhouts & Guthrie, architects, 424 Jefferson Street, will be ell-shaped, 62 x 270 ft., one-story and cost \$75,000. The equipment has not yet been purchased. Louis G. Widule is county clerk.

The Janesville Tractor & Engine Company, Janesville, Wis., which was recently organized, will build and equip a plant.

Cincinnati

CINCINNATI, OHIO, March 20, 1916.

The steel mills have lately placed some large sized orders for machine tools. The automobile and auto-truck builders are also good customers for this class of equipment, but there has been a let-up in the demand from abroad. The railroads are also slow in placing orders for machinery of any kind. Builders of portable electric drilling machines and grinders have about all the work they can conveniently take care of at present. The boiler business is slow, but the demand for tanks is excellent. Makers of ice machinery report an improvement in business, not confined to any particular section of the country.

The labor situation is unchanged, and while numerous open threats of calling a strike of machinists have been made by labor agitators no definite steps have been taken. Competent authorities state that they do not now believe any determined effort will be made this spring to tie up the shops since the strike last year proved so barren of results for union labor.

The Ault & Wiborg Company, Cincinnati, will build a chemical plant in St. Bernard suburb. It will also add to its plant in Norwood a department for making dyestuffs.

On March 17 fire almost completely destroyed the carriage factory of the Sayers & Scoville Company, Cincinnati, entailing an estimated loss of \$200,000. It will be rebuilt as soon as insurance adjustments are made.

The Hamilton Sanitary Mfg. Company, Hamilton, Ohio, was purchased by the Huntington Sanitary Mfg. Company, Huntington, W. Va., and the plant at Hamilton will be moved to Huntington at an early date.

It is reported that the Maxwell Motor Car Company, Dayton, Ohio, is having plans prepared for an addition to its plant. It recently installed a large lot of equipment.

The Victor Rubber Company, Springfield, Ohio, maker of pneumatic tires, has had plans prepared for additions to its plant that will nearly double its capacity.

The Webster & Perks Tool Company, Springfield, Ohio, has leased additional space in the Shuey Factories Building that will enable it to greatly increase its present output of machine tools.

The Vernon Mfg. Company, Columbus, Ohio, has been incorporated with \$5,000 capital stock by Walter Vernon, and others. It expects to manufacture household specialties.

The Farmers Fertilizer Company, Columbus, Ohio, is making an addition to its plant to be used for manufacturing sulphuric acid.

The John Kellar Mfg. Company, Columbus, Ohio, recently incorporated with \$10,000 capital stock, is fitting up a plant for the manufacture of mechanical toys.

The industrial department, Chamber of Commerce, Columbus, Ohio, John A. Kelley, manager, has issued an industrial directory of the city of Columbus showing 949 manufacturing plants in Columbus making 2235 different articles.

The St. Mary's Machine Company, St. Mary's, Ohio, is installing machine tool equipment in its plant that will increase its present capacity nearly 50 per cent.

The Byesville Mfg. Company, Byesville, Ohio, has been incorporated with \$10,000 capital stock by L. W. Sayre, and others. It will establish a wood-working plant for the manufacture of tool handles.

Cleveland

CLEVELAND, OHIO, March 20, 1916.

The machine-tool market has quieted down somewhat. Dealers are getting a good volume of orders for single tools, but no business in round lots has developed during the past few days. Milling machines are in good demand and are scarcer for early delivery than any other standard machines. While the demand for lathes continues active the pressure has been relieved somewhat by the large increase in production, due to various companies entering this field that had not previously built lathes. After some slackening in demand, the call for second-hand machinery is more active. Orders for electric traveling cranes are very heavy. A large amount of construction work in new plants and additions continues to come out in this section, with a steady demand for machinery, and crane equipment.

The American Shipbuilding Company, Cleveland, will build a new foundry in connection with its Lorain, Ohio, plant to supply its increased demand for castings. It will be about the same size as its Cleveland foundry and will be equipped with two cupolas. The contract for the engineering work has been placed with Pracke & Perrine, architects and engineers, Pittsburgh, Pa.

The Horsburgh Forging Company, Cleveland, has awarded the contract for the erection of its new plant at 17301 St. Clair Avenue, consisting of a steel forging shop, 70 x 225 ft., and a machine shop, 70 x 100 ft. A power plant will be installed, as well as new hammer and other equipment.

The Fulton Foundry Company, Cleveland, has entered into an agreement with the Atlantic Foundry Company to take over the operation of the latter company's foundry.

The Ford-Clark Company, Cleveland, maker of automobile accessories, has purchased the plant of the Aetna Rubber Company on Perkins Avenue and will probably make some extensions. The Aetna Company will remove to a new plant on East Seventy-ninth Street.

The Dolomite Products Company, Cleveland, has been incorporated with a capital stock of \$350,000 by H. P. Eells, R. H. Cromwell, and others.

The King Bronze & Aluminum Company, 1730 East Thirty-seventh Street, Cleveland, will build an addition to its plant.

The Marion Tire & Rubber Company, Marion, Ohio, has acquired a four-acre site and will shortly begin the erection of a tire-making plant.

The Moser Pattern & Foundry Company, the Newark Stamping Company and the Huffman Plating Works, Newark, Ohio, have been consolidated as the Newark Stamping & Foundry Company, capitalized at \$50,000. The officers are Charles F. Sites, president; Fred W. Moser, vice-president; Harvey J. Alexander, secretary, and Eugene F. Ball, treasurer and manager.

Indianapolis

INDIANAPOLIS, IND., March 20, 1916.

The Grasselli Chemical Company, Cleveland, Ohio, has bought 265 acres at Terre Haute, Ind., as a site for a factory and 1500 acres of coal rights. The Chicago & Eastern Illinois Railroad Company is building a switch to the site. The plant, it is said, will cost \$1,000,000.

The National Car Coupler Company, Attica, Ind., has plans made for two additional buildings, to cost \$75,000.

It is announced that the cutlery factory being built at Tipton, Ind., by Henry Claus, Fremont, Ohio, will be making shears by June 1.

The Swartz Electric Company, Indianapolis, has increased its capital stock from \$150,000 to \$300,000.

The Union Motor Device Company, Indianapolis, has been incorporated with \$20,000 capital stock to make automobile accessories, by J. R. Craig, C. W. Coffman and W. C. McNabb.

The Diamond Wire & Iron Works, Indianapolis, which has been under a receivership, has dissolved and a new corporation bearing the same name and having \$10,000 capital stock succeeds it. The incorporators are Herbert R. Luckwall, Robert H. Wilson and Charles A. Bates.

The Adrian Company, New Albany, Ind., has been incorporated with \$50,000 capital stock to manufacture automobiles. The directors are A. I. O. E. and M. V. Shrader.

The Evansville Veneer Company, Evansville, Ind., will build a new factory to replace the one recently destroyed by fire.

The Oglesby Furnace-Stove Company, Clinton, Ind., has been incorporated with \$50,000 capital stock to manufacture stoves and furnaces. The directors are George T. Oglesby, John M. Johnson, Grandville W. Sharp, William J. Dawson and Mark E. Nebeker. The Oglesby Stove & Furnace Company, Frankfort, Ind., has been dissolved.

The Hammond Brass Works, Hammond, Ind., has increased its capital from \$35,000 to \$55,000.

The Midland Recoveries Company, Hammond, Ind., has been incorporated with \$75,000 capital stock to manufacture, mill and smelt metals. Frank S. Betz, Francis C. Ryan, William Wilkie, Jr., Herman C. Groman and Charles J. Chapin are the directors.

The Lafayette Safe & Lock Company, Lafayette, Ind., has filed notice of dissolution.

An item in THE IRON AGE of March 2 regarding the International Iron Works, Evansville, Ind., is incorrect. The name of the company is the International Steel & Iron Company. It is erecting a plant 50 x 160 ft., not 30 x 160 ft., as was stated. Store fronts, for which it requires a planing mill, constitute one of its chief products.

Birmingham

BIRMINGHAM, ALA., March 20, 1916.

Wholesale machinery dealers report business good in all lines, with sawmill and electric apparatus leading in the demand. Coal mines are active buyers. Collections are fair. The volume of business is satisfactory.

The Alabama Fuel & Iron Company will reopen ore mines at Russellville and install machinery, etc., at a cost of \$100,000. J. M. Overton, Nashville, is president.

The Lindsey Lumber Company, Mobile, Ala., recently organized with a capital stock of \$50,000, will establish sawmills. Martin Lindsey is president.

The Bulloch Packing Company, Statesboro, Ga., has been organized with a capital stock of \$150,000 to establish a meat-packing plant.

The Savannah Warehouse & Compress Company, Savannah, Ga., has been incorporated, with a capital stock of \$300,000 to establish two cotton compresses. Gordon & Co., Inc., J. F. Livingston, and others, are promoting it.

The Mount Airy Water & Light Company, Mount Airy, N. C., purposes to construct an additional hydroelectric generating plant.

The Central South

LOUISVILLE, KY., March 20, 1916.

Business continues excellent in this section. Limited operations of any manufacturing plants are stated to be affected by other conditions than lack of demand. Overtime is the rule and inquiries and specifications are increasing in number. One especially large ice machinery inquiry is receiving careful consideration. Power requirements are holding up and machine tools are in steady demand.

The Alvey Auto Top Company, Louisville, has been incorporated with \$100,000 capital to manufacture a patented automobile top, and to repair and rebuild motor vehicles. The incorporators are C. R. and B. H. Alvey and George L. Forbush.

E. J. C. C. and R. L. Mercke, comprising the Jefferson Wood-working Company, have purchased the plant of the Pioneer Pole & Shaft Company, Fourteenth and Hill streets, and will consolidate it with their plant at Thirteenth Street and Grand Avenue, making extensions of equipment, etc. The Jefferson Company has operated a table slide, table rim and table leg plant.

George D. Todd of the National Hame & Chain Company, New Albany, bought the equipment of the Kentucky

Rim & Shaft Company, for \$1,500 and will remove from Louisville to the New Albany plant.

Fire destroyed the roundhouse and repair shops of the Louisville, Henderson & St. Louis Railway at Cloverport, Ky., March 14, with a loss estimated at from \$125,000 to \$150,000 exclusive of rolling stock. R. N. Hudson, Louisville, is president.

The boiler equipment of the Pikeville Planing Mill & Supply Company, Pikeville, Ky., was destroyed by an explosion, which wrecked the plant.

Alexander Brothers, Cadiz, Ky., propose to construct a cold storage plant in connection with their ice plant.

Information and bids on water filtering outfits with 15,000 to 25,000 gal. hr. capacity are asked for by the Williamsburg Water Company, Williamsburg, Ky.

The Roy C. Wayne Supply Company, 1401 Lincoln Building, Louisville, is in the market for a used stone or iron planing machine, to handle stone 8 ft. sq. and 3 to 5 in. thick.

The Evansville Veneer Company, Evansville, Ind., will replace its plant, recently burned, with a building to cost \$10,000.

The Bucyrus Steam Shovel Company, Evansville, Ind., has taken a sub-contract for making high explosive, 8-in. howitzer shells held by the Mississippi Valley Metal Products Company.

E. VanWinkle, Atlanta, Ga., will establish a plant at Alton Park, Tenn., to manufacture and assemble automobiles and motor trucks.

The Virginia Iron, Coal & Coke Company has leased tracts of ore land in Greene County and proposes to begin operating there.

The Southern Tile & Brick Works at Jackson, Tenn., will enlarge its plant to produce 20,000 fire brick daily.

The Lexington Engine & Boiler Works, Lexington, Ky., has declined a contract to manufacture shells. Contracts on the books are sufficient, it was stated, to keep the company operating to capacity for months to come on normal business. Roger D. Williams is president.

The Chattanooga Aseptic Cotton Company, Chattanooga, Tenn., will rebuild the plant reported burned at a loss of \$75,000 on stock and machinery.

St. Louis

ST. LOUIS, MO., March 20, 1916.

The plant of the St. Louis Plate Glass Company, Valley Park, Mo., a suburb of St. Louis, has been destroyed by fire with a loss of \$350,000. The most expensive portion of the machinery was in the burned structure. Vice-president D. K. Albright expects the plant to be re-equipped. It had just been restored after serious damage by floods.

The Fulton Iron Works, St. Louis, Mo., has increased its capital from \$500,000 to \$750,000 and will add equipment to increase its capacity for manufacture of sugar mills and Diesel oil engines 50 per cent.

The Bremer-Waltz Corporation, 4620 North Broadway, St. Louis, Mo., is in the market for a second-hand steel or non-porous metal rolling mill which is readily available.

St. Charles, Mo., a St. Louis suburb, has inaugurated plans for mechanically operated river terminals.

The Liberty Foundry Company, St. Louis, Mo., has increased its capital stock from \$25,000 to \$75,000 and will increase its facilities.

The Metallic Sash Operation Company, St. Louis, Mo., has been incorporated with a capital stock of \$13,000 by Oliver H. Queonheim, John J. Waddock and Hector Neuhoft, Jr., to manufacture metallic sash operators, etc.

The Potter Electric Signal & Mfg. Company, St. Louis, Mo., has been incorporated with a capital stock of \$150,000 by C. E. Potter, A. L. Potter, Charles A. Powers, and others, to manufacture signal devices.

Harry W. Graham, and others, of Chillicothe, Mo., have plans for the early equipment of a plant for the manufacture of tractors. The investment will be about \$100,000.

The equipment to be installed in the St. Louis, Mo., plant of the Lowell Bleachery Company, Lowell, Mass., is expected to involve \$75,000, aside from machinery already bought.

Duncan, Mo., Henry Cluskey, town clerk, will receive bids on pump, motors, etc.

The Star Brass Works Company, Kansas City, Mo., has erected a two-story plant, where it will manufacture brass specialties for motor cars, as well as a general line of metal goods.

Texarkana, Ark., will install additional pumps in its waterworks plant at a cost of about \$30,000.

J. L. Milner, Grenada, Miss., will equip a wood-working plant at Batesville, Ark., to manufacture wagon accessories, automobile rims, etc.

The White Hall Cooperage Company, White Hall, Ark., E. V. Phillips manager, will equip a plant of 40,000 staves daily capacity.

The Coal & Smoke Economy Company, Springfield, Mo., has been incorporated with a capital stock of \$19,000 by O. M. Evans, W. H. Kirby and Harry F. Gray, to manufacture fuel-saving devices.

The Checotah Water, Light & Ice Company, Checotah, Okla., is in the market for one 75-hp. natural gas engine, one 75-kw. generator, etc.

Ford & Roberts, Ada, Okla., have contracted for building a machine shop, and will buy machinery.

The Rex Mfg. Company, Muskogee, Okla., has been incorporated with a capital stock of \$25,000 by Mandly Board, H. E. Wiedermith, W. H. Pritchett and James L. Powell, to manufacture stoves, ranges, etc.

The Machinery Sales Company, Oklahoma City, Okla., has been incorporated with a capital stock of \$25,000 by L. W. Thompson, L. K. Butts and H. M. Hedrick.

The White's Spring Tire Company, Edmond, Okla., has been incorporated with a capital stock of \$50,000 by Jesse W. White, M. J. O'Connor and John F. Sumner, and will equip a tire-making plant.

The Rice Auto Company, Blackwell, Okla., has been incorporated with a capital stock of \$15,000 by E. D., C. E. and F. J. Rice.

Cleveland, Okla., will add four turbine pumps, with motors, to its waterworks plant. Albert C. Moore, Joplin, Mo., is engineer in charge.

The American Gum & Sales Company, Kansas City, Mo., has been incorporated with a capital stock of \$40,000 by H. T. Nelson, M. M. Pumphrey, and others, and will manufacture vending machines.

The Kelsey Iron Company, Morrillton, Mo., has been organized by John A. Gilliam, La Salle Building, St. Louis, Mo., with a capital of \$100,000 and is preparing plans for mining equipment and blast furnace operation.

The C. S. Bankard Machinery Company, Joplin, Mo., has increased its capital from \$5,000 to \$10,000 and will extend its operations.

The Improved Brick & Stone Company, Meridian, Miss., has been incorporated with a capital stock of \$50,000 and has removed its headquarters from Byhalia, Miss. It will establish a plant of 20,000 bricks daily capacity. W. L. Sanderson, Masonic Temple Building, is president.

L. F. Richardson and R. L. Speed, Columbus, Miss., with others, will equip a plant for the manufacture of a patented car seal.

The Missouri Brick & Tile Company of Kansas City, Mo., has been incorporated with a capital stock of \$200,000 by Phil R. Toll, Louis L. Seibel and Alfred Toll.

The machine shop and vulcanizing plant of I. Schwarz, Belleville, Ill., has been damaged \$10,000 by fire.

The Calcasien Ice & Mfg. Company, Lake Charles, La., has been incorporated with a capital stock of \$250,000 by J. A. Bee, O. J. Morris, Walter G. Moeling, and others, and will equip an ice-making plant.

J. P. Wirth, Shreveport, La., will equip an electrically operated wood-working plant to manufacture church and school furniture.

The Busch Box Factory, New Orleans, La., has been burned. The equipment, valued at \$30,000, will be replaced.

Texas

AUSTIN, TEX., March 18, 1916.

Excitement and uneasiness over the situation in Mexico had a bad effect upon the machinery and tool trade in Texas and the Southwest this week. It is expected, however, that conditions will improve very soon. Another unfavorable factor is the protracted drought which is seriously hindering farming operations all over the State.

The Vermont Marble Company, Proctor, Vt., which operates marble quarries near San Saba, plans to enlarge its plant.

The Houston Cotton Oil Mill Company, Houston, which operates cotton-seed oil mills over the state, plans to equip some with machinery for crushing peanuts.

The Gunter Power & Light Company, Gunter, will build an electric light and power plant.

The Sealy Oil Mill & Mfg. Company, Sealy, has increased its capital stock from \$40,000 to \$50,000, and will make improvements to its cotton-seed oil mill.

The Pacific Coast

SAN FRANCISCO, CAL., March 14, 1916.

The machine-tool trade has taken quite a spurt this month. Conditions are favorable for manufacturing expansions, and as reports from sales agents and buyers returning from the East give assurance of high prices for tools for an indefinite period prospective purchasers show greater willingness to close at present prices than has been manifest before. Deliveries are still a deterrent factor, but less so than formerly, and merchants expect larger shipments on old orders by midsummer. On some tools, however, deliveries are further off than ever. The demand continues strong among shipbuilders, and is becoming general among shops handling a variety of work. Second-hand tools are in strong demand which has enabled many shops that were unprofitable or poorly financed to close out to advantage.

Gas engine manufacturers are busy, though their export trade is hardly normal. Diesel-type engines are in good call, especially from mines in the arid regions of Nevada and Arizona. Oil pumping equipment is in strong demand, with some manufacturers working double shifts, and the same is true of tractors. Lumber manufacturers are making many long-delayed improvements, though few complete new outfits are being purchased.

Orders for lumber from British Columbia are coming from all points, the extent of this industry being emphasized by the demands for cars from the railroads. The Canadian Northern has received requisitions for 250 cars for shipment from mills in the Vancouver and New Westminster districts.

The shortage of tonnage continues to hamper shipments. The DuPont Powder Company, Tacoma, Wash., it is stated, has offered from \$18,000 to \$20,000 a day for twelve large freighters of the American Hawaiian Line, to carry nitrates from Chile to New York.

The Diamond Lumber & Shingle Company, Ltd., Vancouver, B. C., has been incorporated for \$50,000 and it is understood will construct a sawmill in the vicinity of Vancouver.

The Red River Lumber Company, Westwood, Cal., is preparing to add a new double-cut 6-ft. bandsaw and a new battery of boilers to its mill.

T. W. Beam, who is interested in the Eureka mine near Sutter Creek, Cal., is arranging to purchase a pumping plant of large capacity, etc.

The Van Emon Elevator Company, 46-54 Natoma Street, San Francisco, retiring from business, is offering for sale a list of second-hand machinery, including lathes, planing machines, etc., in good condition.

E. T. Murray has taken over the stock of F. Monser in the Southwestern Machinery Supply Company, Deming, N. M., and will open a machine shop in connection with the other departments.

The Rudgear-Merle Company, San Francisco, Cal., ornamental iron and bronze manufacturers, has plans for a frame building at Bay and Powell streets, three stories, 206 x 275 ft.

The local lighthouse inspector, San Francisco, is taking bids for two direct-connected horizontal distillate-driven air compressors for Point Concepcion Light Station.

The Pacific Boiler Company, Seattle, Wash., which plans to remove its plant to Tacoma in April, has purchased about \$8,000 worth of new machinery. It has leased the factory of the Globe Iron Works, Tacoma, and will have a payroll of more than 100 men.

The Ferris Motor & Machine Company, now located at Broadway and East Denny Way, Seattle, will move this month to 815 East Pike Street, where it will have 13,680 sq. ft. of floor space. It plans the installation of new machinery and equipment.

The North Bank Railroad Company, Vancouver, Wash., contemplates the expenditure of more than \$20,000 in Vancouver in improvements to its holdings. The roundhouse is to be enlarged, a plant for reclaiming scrap iron erected, and more than \$15,000 in machinery expended.

Thomas & Jamison, Nes Perce, Idaho, incorporated for \$25,000, have purchased the business of the Western Hardware & Implement Company which will be known under the new name. It also owns plants at Vollmer and Lewiston.

A syndicate composed of S. M. Mears of the Columbia Engineer Works, and Alfred Smith, president Smith & Watson Iron Works, will be formed in Linnton, Ore., to erect a shipbuilding plant in that city, to manufacture practically all the composite parts of steamers. It is estimated the plant will cost approximately \$1,000,000 and will occupy 900 ft. of river front. Plans are being prepared for two lumber vessels of 3,000,000 ft. capacity each. F. A.

Ballin and J. B. C. Lockwood, naval architects, will be consulting engineers.

The Gerlinger Motor Company, Portland, Ore., capitalized at \$100,000, will construct a factory in Tacoma, Wash., to manufacture the Ger-Six motor truck, designed by George Peters, chief engineer of the company. E. E. Gerlinger, president and general manager, states that war orders sufficient to last six months are now on hand. Production will start during April.

Canada

TORONTO, March 18, 1916.

Canadian firms are being asked to put in tenders for government works to be constructed in Australia, New Zealand, and other British dominions, and are at the same time receiving large orders for locomotives, cars, shells, guns and other war munitions from Great Britain, France and Russia.

Some of the steel companies are carrying on negotiations with Russia for large munitions orders to be placed here. Orders to the extent of \$100,000,000 will be placed in Canada for shells and other munitions of war. These orders will be placed in small lots for which competitive bids will be asked.

It was reported in the House of Commons recently by Dr. Reid, Minister of Railways, that the government railroads were in very good condition, but that in no time in their history has new equipment been more needed than at present.

The James Smart Mfg. Company, Brockville, Ont., a subsidiary of Canada Foundries & Forgings, is expanding its export business. It has received a large order for mining hammers from South Africa and an unusually large order from New Zealand for cast iron hardware articles. In addition it is preparing to develop an export trade with Russia, and a representative will take a full line of its products to Russia next month. Additional electric railroads will be constructed, especially in Ontario. There is a general increase in the mining activities of Ontario.

Arrangements have been completed between the Canadian Bankers' Association, the Munitions Board and the Minister of Finance whereby a further credit of \$75,000,000 for munitions orders is established. The report was definitely confirmed by Sir Thomas White recently. New orders amounting to \$20,000,000 have been received by the Munitions Board in the past two weeks, in anticipation of the financial arrangement being concluded, and in the next few months further commitments to the extent of \$75,000,000 or very probably \$100,000,000 are anticipated. The money will be applied to the purchase of shells, cartridges, cases, primers, etc. It will bring up to about \$400,000,000 the volume of the war orders placed in Canada. The contracts for the extra \$20,000,000 of orders will be placed gradually. Chairman Flavell states that they are being awarded almost daily as additional or renewal orders to firms already executing contracts and whose delivery is up to the mark.

When it was announced a short time ago that the Dominion Bridge Company, Montreal, had secured a Russian munition order, it was generally understood that it was of moderate size. Officials of the company have not discussed the order; but it has developed recently that so far from its being somewhat of a test affair, it ranks as one of the best the company has yet closed. It assures active operations for part of its plants for many months to come, apart from British orders now in hand.

The Hare Engineering Company, Ltd., Toronto, manufacturer of rolling mill machinery, etc., is moving from 115 King Street East to 99 King Street West, where enlarged facilities for its business has been secured.

The Sudbury Construction & Machine Company, Ltd., Sudbury, Ont., is building brick and steel additions to its plant, including a cupola house 30 x 40 ft., in which a new furnace will be installed; an addition, 30 x 40 ft., is being made to the foundry, which will be devoted entirely to the casting of brass; a cleaning house is also being erected where all castings will be finished. The new additions will increase the plant capacity by 50 per cent.

The National Equipment Company, Ltd., Toronto, manufacturer of gasoline engines, pumps, etc., is erecting a tank shop, in which new machinery will be installed.

The Maxwell Motor Company will commence building operations immediately on a new concrete plant, 100 x 300 ft., at Windsor, Ont., to cost \$65,000. It will be equipped with new machinery and will have a daily capacity of 30 cars.

The Brown Copper & Brass Rolling Mills, Ltd., is having a brass rod and shape mill erected at New Toronto, Ont., which will cost about \$125,000.

The American Well Works Company, Aurora, Ill., is putting its plant at Chatham, Ont., in order and installing

machinery for the manufacture of pumping machinery, etc. F. J. Lukins will be Canadian manager.

Alexander Callander is erecting a foundry on York Road, Guelph, Ont., 50 x 100 ft., to cost \$8,000. Small castings will be manufactured.

A. J. Bates, of the McConkey Bates Company, will build a plant at Stratford, Ont., for the manufacture of corrugated iron, etc.

The Ontario Yarn Company, Markham, Ont., will build a spinning plant at Hamilton, Ont. Machinery worth \$20,000 will be purchased. J. A. Kammerer, Toronto, is president, and F. H. Yapp, Hamilton, is secretary.

The Ford Motor Company of Canada will build a four-story service and assembling plant at Fifth Avenue and Fir Street, Vancouver, B. C. W. G. Patrick is local manager.

Walter A. Moison, Drummondville, Que., is calling for bids for the construction of a pumping station and filters.

Calgary, Alberta, will purchase machinery for the city power plant.

The shell factory of the Renfrew Machinery Company, Renfrew, Ont., was destroyed by fire with the loss of \$100,000. The plant will be rebuilt immediately.

The Galbraith Company, Ltd., Owen Sound, Ont., will install machinery in its plant for the manufacture of toys. E. Galbraith is purchasing agent.

The Laurentide Company, Montreal, will build an addition to its plant to double its capacity. Machinery will be installed in the addition and 15,000 hp. additional will be required to operate the plant.

Fire did \$10,000 damage to the munitions plant of B. Bell & Son Company, Ltd., St. George, Ont.

Fire did \$5,000 damage to the MacDonald Thresher Company's plant at Stratford, Ont.

Orillia, Ont., will install new machinery at its sewage pumping station. W. K. Greenwood is engineer.

The Canada Carbide Company, Ltd., Shawinigan Falls, Que., will make extensions to its plant to double the capacity.

The property department, Toronto, will build an addition to the civic abattoir and install two new boilers at a cost of \$14,000. R. C. Harris is commissioner of works.

The Bedford Mills Electric Company, Newboro, Ont., will install a 60-kw. dynamo connected to a water wheel, etc., at a cost of \$6,000. R. P. Tett is manager.

Lethbridge, Alberta, will purchase a motor-driven booster pump to cost \$4,000. W. A. Stevens is clerk.

The Hupp Motor Car Corporation has been granted permission to carry on a manufacturing business in Ontario with a capital stock of \$100,000, to manufacture automobiles, etc., and has appointed Edmund A. Cleary, Windsor, Ont., its attorney.

Kasler Brothers, Ltd., Fort William, Ont., has been incorporated with a capital stock of \$50,000 by William F. Roach, John H. Gillespie, William A. Samuel and others to manufacture jewelry, watches, clocks, etc.

Hill, McLean & Tipping, diking commissioners of Nicomen Island, B. C., contemplate installing pumps to remove surface water.

The Henry Steamship Company, Ltd., Vancouver, B. C., has been incorporated with a capital stock of \$250,000, by James H. Lawson, William S. Lane, Robert G. Parker and others to build boats, docks, wharves, etc.

The Modern Heating & Engineering Company, Ltd., Montreal, has been incorporated with a capital stock of \$49,000 by Joseph E. Gravelle, Joseph Caron, Odilon A. Archambault and others to manufacture iron, steel, metals, etc.

Bids will be taken until March 31 by the superintendent of the city waterworks, St. Mary's, Ont., for a 2,000,000-gal. centrifugal pump.

The Frost Steel & Wire Company, Hamilton, Ont., has been incorporated with a capital stock of \$6,000,000 to manufacture fences, gates, posts, etc. H. L. Frost, A. L. Pope and C. A. Smith, Hamilton, and Richard Harcourt, Welland, Ont., are the directors.

The Pollard Mfg Company, Niagara Falls, Ont., will build an addition to its plant and install new machinery for the manufacture of steel vaults, special machinery, etc.

Government Purchases

WASHINGTON, D. C., March 20, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, schedule 9434, for one saw and dado combination machine and one single cylinder surfacing machine, both for Norfolk; schedule 9436, for 30 blowers for various navy yards; schedule 9437, for one winding machine for Norfolk; schedule 9439, for six motors

for Puget Sound; schedule 9447, for one head planing and horizontal boring, drilling and milling machine and one crank shaft and steam turbine lathe, both for Mare Island; schedule 9456, for nine $\frac{1}{4}$ -hp. ventilating sets for Mare Island; schedule 9457, for one blower for Puget Sound; schedule 9461, for one beveling machine for Brooklyn.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, March 14, for material for the navy yards, as follows: Schedule 9338, construction and repair, class 81, Philadelphia—for one steam hammer—Niles-Bement-Pond Company, \$1,114 and \$1,390; Sherritt & Stoer Company, \$1,936; schedule 9339, aeronautics, class 91, Pensacola—for one wire-testing machine—Tinius Olsen Testing Machine Company, \$2,000.

NEW TRADE PUBLICATIONS

Molding Machine.—E. H. Mumford Company, Elizabeth, N. J. Bulletin No. C-14. Pertains to a combination jolt and squeeze ramming split pattern molding machine, which was illustrated in THE IRON AGE, Nov. 4, 1915. The special feature of this machine is that it first jolt rams and then squeeze rams the mold, after which the pattern is started gently by hand and afterward drawn by power. Special emphasis is laid upon the economy of using this machine and an illustration of the machine with the various parts marked clearly to identify them and a table of the sizes that can be furnished are given.

Stone and Gravel Handling Machinery.—Link-Belt Company, Chicago, Ill. Book No. 213. Gives general description and specifications for a line of elevators, conveyors and other machinery for handling, preparing and storing gravel, stone, sand, etc. The illustrations for the most part are those of actual installations, although there are a few line drawings showing typical arrangements for gravel washing plants and dimension diagrams. Mention is also made of a line of portable loaders for wagons and cars.

Forgings and Castings.—Union Switch & Signal Company, Swissvale, Pa. Pamphlet. Refers to the manufacture of forgings and grey iron and mild steel castings, which the company is engaged in commercially. The equipment which the company has provided in a separate forging department building is listed and mention is made of the facilities afforded by its foundry and machine shop. Among the lines of forgings which the company is prepared to handle are those for aeroplanes, automobiles and railroads and general service.

Autogenous Welding and Cutting Apparatus.—Modern Engineering Company, Fourteenth and St. Charles streets, St. Louis, Mo. Several circulars. Describe and illustrate a line of oxy-acetylene welding and cutting apparatus, the special feature of which is the torch. Views of the various outfits that can be supplied are presented, together with lists of the apparatus and accessories included in each. The features of safety, strength and durability, and ease with which a cutter can be attached to the torch are gone into at some length in one of the circulars and an illustration of the torch calling attention to the various features is included. An illustrated description of the torch appeared in THE IRON AGE, Nov. 4, 1915.

Electrical Equipment.—Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa. Two catalog sections. The first, IP54, illustrates and describes a new pressed steel motor for constant and adjustable speed continuous duty service. The construction of the motor, which is built in sizes ranging from $\frac{1}{2}$ to 650 hp. for use on alternating-current circuits of from 220 to 2200 volts is explained in considerable detail. The other section, DS919, describes and illustrates a line of switchboard meters for measuring pressures, current and energy. The particular advantages of this type of instrument are thoroughly explained and illustrations of the different types are presented, including the illuminated dial type.

Pneumatic Appliances.—Curtis Pneumatic Machinery Company, St. Louis, Mo. Catalog No. 63. Presents illustrations and brief descriptions of a line of pneumatic appliances, including air compressors, air hoists, trolleys and trolley systems, sand blasts, pneumatic and hydro-pneumatic elevators and jib and traveling cranes. Views of the different parts of the several appliances are presented, together with engravings of a number of actual installations. Dimension tables and diagrams form a feature of the catalog.

Forging Machinery.—National Machinery Company, Tiffin, Ohio. Forging machine talk No. 8. Concerned with the manner of aligning heading slides in the company's forging machine, in which the slide is suspended so that the supporting bearings are at the top of the slide and consequently above the path of scale and water. The use of

separate bearing liners at the front and rear portions of the slide is mentioned, and drawings showing the way in which the slide is suspended and the sectional liners are used are included.

Coal and Ash Handling Equipment.—R. H. Beaumont Company, Drexel Building, Philadelphia, Pa. Catalog No. 20. Illustrations and descriptive matter explain the operation of a line of machinery for handling ashes and coal. In addition to the illustrations of the various pieces of apparatus used, a number of views of actual installations are included.

Twist Drills, Reamers, etc.—Cleveland Twist Drill Company, Cleveland, Ohio. Catalog No. 38. Supersedes all previous issues and describes a line of twist drills, reamers, sockets, counterbores, mills, mandrels and arbors. For the most part a separate page is given to each tool with an engraving at the top, followed by a list of the sizes that can be supplied. A classified index and one of list numbers are given to enable any tool to be found readily, and a number of tables of useful information and a telegraph code are included.

Steel Sheets.—American Sheet & Tin Plate Company, Pittsburgh, Pa. Pamphlet. Describes a series of tests having for their object the determination of the increased resistance to corrosion of steel containing a small amount of copper over material not treated in this way. Illustrations showing the various sheets tested at different times are presented, and the results are tabulated and in addition are summarized.

Concrete Mixer.—T. L. Smith Company, 3135-X Hadley Street, Milwaukee, Wis. Folder. Gives illustrations of practically every combination that can be made of a small portable concrete-mixing machine having a capacity of 3 cu. ft. per batch. The illustrations include the use of a power-charging device, a gated batch hopper, a low-charging platform and the hoist mounted on the truck between the engine and the mixer drum. The various features of the mixer are printed around an engraving of the machine, with leaders pointing to the different parts. A number of views of the mixer in actual use are also presented.

Brass and Copper Products.—U. T. Hungerford Brass & Copper Company, 80 Lafayette Street, New York City. Catalog. Size 6 x 9 in.; pages, 404. Illustrates a complete line of brass and copper products, which includes sheets, rods, wire, rivets, screws, wire cloth, railings and fittings, chain, etc. The book is divided into eighteen sections, and an index to these is given in the front of the catalog showing the different materials covered by each and the pages in the catalog on which they are described. A concise price list is given in each section, together with a list showing the material carried in stock ready for prompt shipment. Illustrations of the various articles are presented in the several sections, and a number of tables of useful information and a complete index are included.

Expansion Joint for Pipes.—Ross Heater & Mfg. Company, Buffalo, N. Y. Catalog A. Illustrates and describes an expansion joint for high and low pressure steam, oil, gas and water piping. After a brief discussion of the expansion and contraction of pipe lines, the construction of the joint, which is of the cross-head-guided type, is gone into at some length, the text being supplemented by a number of engravings. The advantages of the joint are briefly summarized and instructions for its installation are presented, together with dimension diagrams and tables. Mention is also made of a multi-head feed-water tube heater.

Valves, Hydrants and Steam Traps.—Pratt & Cady Company, Inc., Hartford, Conn. Catalog. Size 6 x 9 in.; pages, 221. Calls attention to a line of valves which are made in all the customary types and equipped with either renewable asbestos or bronze disks and renewable bronze seat rings. Illustrations of the various valves that can be supplied are given with tables of the sizes. Hydrants for municipal or factory service are also shown, and mention is made of a line of boiler-room appliances and safety devices. Complete dimension tables for the various valves are grouped in one section of the catalog, and a special telegraph code is included.

Metallographic Apparatus.—Sauveur & Boylston, Abbot Building, Cambridge, Mass. Collection of circulars. Point out the advantages of using the company's line of metallographic apparatus, which includes metalloscopes, hacksaw and polishing machines, and photomicrographic apparatus. All of the various appliances are illustrated and briefly described, and one of the circulars contains a partial list of users.

Motor Trucks.—Packard Motor Car Company, Detroit, Mich. Issue No. 1 of the "Packard Truck Digest." Calls attention to a light service truck that has been developed along the same lines as the company's heavy-duty type. A double-page engraving showing the arrangement of the various parts of the truck is presented, together with interesting experiences of users of the company's trucks. Figures on the reduction in cost of transportation effected by the use of the trucks are included in a number of cases.

ESTABLISHED 185

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